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CONTENTS

The principal shops of one of the large western roads use a simple and effective scheme for keeping line shafting clean and bright, which we have not seen in use in any other railway shop. Leather rings cut from old belting are put loosely around the shaft between the pulleys, there being two or three or more between each pair of pulleys, or pulley and hanger, depending on the distance. The rings are cut in order to put them around the shaft, and the adjoining edges then wired together. Instead of the cut being straight across—radial—it is given a very flat V-shape to make the wired joint more secure. As the shaft revolves, these rings travel back and forth and keep the surface looking like new.

In his annual report for 1908 the general manager of the Government Railways of the Cape of Good Hope complains that during the year competition by ox carts was especially severe, and goes on to congratulate himself, and the tax payer, on the fact that Parliament has passed a law putting a special tax on ox cart business, and thereby forcing people to ship over the railways. He says: "It is hoped that the action now taken will relegate the ox wagon to its legitimate sphere, that is, to act as a feeder to railways, and not as a competitor." Beyond the rather startling proposition that ox wagons should be dangerous competitors of a system of railways aggregating more than 3,000 miles, the possibilities of government ownership are shown with beautiful clearness and simplicity. The tax payer is called upon to build railways and is then called upon to meet a deficit after payment of interest charges, amounting in 1908 to £575,861 ($2,879,305). Then, when it is found more economical to move traffic by means of carts than on the railways, this business is taxed to such an extent as to do away with competition. The so-called Standard Oil method of eliminating competition was crude and unbusinesslike, compared to the South African method!

The American Society for Testing Materials was formed for the "promotion of knowledge of the materials of engineering and the standardization of specifications and the methods of testing." In order to fulfil this intention it is necessary to harmonize the conflicting opinions held by producers and consumers about engineering materials. The membership of the society is made up of both the producing and the consuming interests, each of equal standing. Strictly professional societies have shown a tendency to regard discussions in which both interests are represented as more commercial than professional, yet an open-minded observer cannot but consider a discussion incomplete if it is carried on by consumers only—half as valuable as if viewed from both standpoints. While it is natural that the consumer specifies materials of the best obtainable quality, he may do so without due consideration of the additional requirements of manufacture necessary to meet the specifications. To guard against this possibility all committees named to prepare or investigate specifications or methods of testing materials are made up both of manufacturers and of consumers. If a consumer demands an unusual product to meet exacting specifications, he must pay a higher price than the man who specifies only a product which will meet average requirements, and one which the manufacturer can make in large quantities. An indication of the general acceptance of the work of committees, even on drawing up standard specifications, is the fact that the reports on "Standard Specifications for Iron and Steel" and "Standard Specifications for Hard-Drawn Copper Wire" were approved by the society, with practically no discussion.

During the discussion which followed the paper of M. H. Wickhorst (C., B. & Q.) "An Interesting Driving Axle Failure," which is reprinted in another column, the writer made a point of the fact that he had taken up his subject in the light of the consumer particularly, with the idea of stimulating argument on the part of the steel manufacturers. He noted that the original billet may have been too small, and that the injury developed during the process of forging it into the axle, his basic question on the subject being, "Can a good axle be made from a poor billet through the process of forging?" A steel manufacturer observed that the axle in question may have been made from a bloom which was too small, or that the hammer used in its subsequent forging may have been so light that the crystals at the center of the mass did not get sufficient compression; also that the steel manufacturer cannot be held responsible for metal which receives subsequent treatment by others. The introductory statement of the chairman of the committee on "Heat Treatment of Iron and Steel," which reported only tentative specifications, without recommendation for their adoption, was as follows: "The aim in preparing these specifications has been to draw up something which would be of use, first to those who are not already

very skilful in such matters, and second as standards to which practice might be referred in case of dispute as to whether a given treatment was reasonable or not. Though skilful steel workers may follow methods more refined than those which we here offer, yet such methods may be less suitable than ours for the particular purposes here in mind."

The Delaware & Eastern operates a line running from East Branch, N. Y., to Arkville, about 38 miles, with a branch from Andes Junction to Andes, about eight miles. The company proposes to build a line from Arkville north to Schenectady, where it will connect with the New York Central & Hudson River, the West Shore, and at Scotia with the Boston & Maine. It also proposes to build southwest from East Branch to Hancock, where it will connect with the Erie. Newspaper reports, which were confirmed only in a rather general and hazy way at the president's office, say that the company has sold $3,500,000 bonds abroad, the proceeds to be used to complete the line from Schenectady to Hancock, in all about 125 miles or more. The bonds are apparently part of an authorized issue of $6,500,000 first mortgage 5 per cent. bonds of 1907-1957, of which there were outstanding previous to this sale $300,000, and of which $1,750,000 are reserved to take up bonds and stocks of the Delaware & Eastern Railroad, on which the Delaware & Eastern Railway guarantees the interest. In the year ended June 30, 1908, there were earnings from operation amounting to $90,804, with expenses of $117,054, leaving after the payment of fixed charges, rentals and taxes a deficit of $109,150. The balance sheet for the year showed current liabilities of $231,728, and current accounts and balances on the asset side of $101,665. Interest on the new bonds at 5 per cent. would amount annually to $175,000, so that apparently the road will have to meet its fixed charges and operating deficit out of the proceeds of the bond sale, since earnings for the 10 months of the present fiscal year ended April 30 amounted to $83,970, or about $10,000 more than for the same period last year, while total expenses amounted to $106,951, or about $12,000 more than last year. So much for the present prospects. The traffic possibilities of a new road from Schenectady to Hancock to connect with the Erie would probably be greater if it were not for the fact that a line of the Delaware & Hudson runs from Schenectady almost parallel and 25 miles north of the Delaware & Eastern to Binghamton, N. Y., which is also on the Erie. Apparently the value of the line will lie rather in its local traffic possibilities than in its situation as a connecting link in some through route. The line now in operation runs along the valley of the Delaware river and connects at Arkville, its northern terminus, with the Ulster & Delaware, over which it can get an outlet to the West Shore. When it is built through to Hancock it will also have a connection with the New York, Ontario & Western at that point, but the Delaware & Hudson line from Schenectady also has a connection at Sydney with the New York, Ontario & Western, so that again it seems that it will have to depend largely for business on what traffic it can originate itself and on the development of the valley through which it runs. Even if the road were extended south into the coal regions around Wilkesbarre it would parallel the Delaware & Hudson and the Ontario & Western, with the prospects of sharp competition.

CAR DOORS.

Although the report on box car doors—presented at the recent M. C. B. convention—was very brief, the discussion of the subject was of much interest and value. It indicated that while the design of the car door and fixtures as recommended is fairly satisfactory, it is not beyond reasonable criticism, neither is it likely to be generally used in preference to the established practice of different railways. Grain doors, either permanent or temporary, have always been a cause of expense, requiring frequent repairs or renewals, and this has grown so burdensome that the executive committee requested this special committee to consider it in connection with car doors. They reported that members are now almost unanimously in favor of temporary grain doors and suggested that the doors be stenciled with owners' initials, and efforts be made to return them to the owners. The heavy expense for grain doors is due to the fact that they are so frequently lost or stolen, and as they are included in the long list of fixtures for which car owners are responsible, there is much difficulty in preventing the loss. The Canadian Pacific representative reported that the expense for renewals of grain doors on that line is $90,000 a year, and on the Burlington system it is $200,000. An interesting item reported by the latter is the fact that box cars on the system averaged only eight trips with grain per year, which was an argument in favor of the temporary door. The permanent grain doors receive the same rough treatment at elevators when the grain is discharged as the temporary doors, and being made of soft wood they are easily injured by axe or crowbar in the effort to open them quickly. All these difficulties in connection with the increasing price of lumber have suggested the use of a steel door which could be made a permanent part of the car and arranged with such positive means of opening that it would not so frequently be injured or destroyed. Steel doors have been recommended by other writers in the technical journals, but the idea has been regarded as the dream of a theorist rather than the suggestion of the practical car builder. At the recent convention two representatives of a large number of cars said that the best remedy for existing troubles with grain doors would be the use of steel doors.

In considering the design of a metal door, the car door proper should be included, and one door made to answer for both purposes. It should of necessity work vertically, and could be made in the form of a rolling shutter. Such fixtures are in general use for covering openings similar to the car doorway, and there seems to be no good reason why the principle could not be applied to the car. Several special requirements would have to be met in such a design. When entirely closed some provision would have to be made for filling the car from the country elevator chute. This could take the form of a small sliding door in the main door, or the opening for filling could be entirely outside of the doorway. Again, a small door would be required for discharging the grain or a portion of it, before attempting to raise the roller shutter, as the pressure of the full load against it would make it difficult to raise. It might be best to make the door in two parts, one the height of the present grain doors, and the top portion to roll down and cover the remainder of the opening. This would provide the opening for filling the car and would allow access for a man to level the load to the grain lines.

These are some of the conditions to be met in the design of a permanent steel door for box cars which shall answer also the purpose of a grain door. The suggestions are given to the inventors and designers of railway supplies, as we believe some of them will see that here is a field which is not already occupied, and an opportunity to benefit the railways and obtain some profit for themselves.

THE DROP TESTING MACHINE.

The M. C. B. drop testing machine, while rather crude as a laboratory fixture and not to be classed among the instruments of precision, has proved to be the most valuable piece of apparatus used by the railway test departments. Designed originally for testing car axles, it has been utilized for determining the comparative strength of quite a number of other railway structures and materials. It has helped immensely in developing the design of various details and has made possible the preparation of specifications which define in exact terms the

desired strength and stiffness of the various grades of steel, which are so largely used by railways.

The M. C. B. car coupler when made of malleable iron was an uncertain fixture until the weak points in the guard arm and knuckle, the lock and the shank were successively developed by drop tests, and when the superiority of cast steel was finally demonstrated it was still necessary to continue the drop tests in order to insure the use of a proper grade of steel. The design of the coupler has been wonderfully improved as the result of the information obtained from the drop testing machine, and it was only possible to make a definite specification for the strength of couplers after data had been accumulated from the results of drop tests. This simple testing machine has been especially valuable in safeguarding the railways against brittle rails, and had it not been for the constant resort to its verdict, the rail supply would have been much more uncertain and unsatisfactory.

With a lighter drop weight, the drop test has been incorporated in the specification for car wheels, and by its use it is made possible to secure uniform product and remarkable strength and safety in the cast iron wheel. On many foreign railways it is a common practice to test steel tires under the drop, and it speaks well for the superior product of American tire mills that it has not been found necessary to make such tests under regular tire inspection in this country. The tests of various forms of draft gear and friction buffers which have been made with the M. C. B. drop testing machine are familiar to all who have been concerned over this weak point in freight car construction, and the comparative value of the numerous inventions which have been developed for freight draft gears and their attachments, have been clearly demonstrated, so that it is possible to make a wise selection. It is not generally known that the drop test was used at one time for ascertaining the degree of security obtained in improved forms of car heaters. When the ordinary Baker heater was made of cast iron it was occasionally broken in collisions, and the fire was scattered and communicated to the train. To prevent this the body of the heater was made of flanged and riveted steel plates, but it was thought possible that the hot coals might escape through the doors when one of these heaters was distorted in a collision. An original and ingenious method of testing this steel heater employed the drop testing machine, and a heater was fired up with its normal contents of red hot coal. It was placed under the drop and subjected to blows from a sufficient height to badly distort it. In this way the insecurity of the door fixtures was demonstrated, and the necessary improvement made.

Our particular reason for referring to the many ways in which the drop testing machine has been utilized for improving the strength of railway structures is in connection with the report of the committee on splicing sills. The ship splice with scarfed faces has been the standard for car sills for many years, and when the superiority of the butt splice was pointed out by the committee on splicing passenger car sills at the convention in 1902 it was not adopted by the subsequent letter ballot, because the opinion of the committee was not sustained by the results of actual tests. This year the committee has been wise enough to test the two forms of splices under the M. C. B. drop testing machine and the results are so convincing that there can be no doubt that a well established standard will be changed and the butt splice adopted in place of the scarfed splice.

It is true that the butt splice recommended is supplemented by a side plank secured by ⅝ in. bolts, and the plank is 2 in. thick if oak and 2½ in. if pine or fir, but the test of the scarfed splice with this side plank showed it to have a resistance far below the butt splice. The present standard scarf splice without side plank failed under a drop of 1,640 lbs. from a height of 1 ft., while the butt splice with side plank failed at 3 and 4 ft., averaging for four tests 3.75 ft., and the straight sill without splice failed at 4 and 5 ft., averaging 4.25 ft. The comparative values of the splices are (taking the straight sill 5 x 9 in. as 100) the scarfed splice 23.5 per cent. and the butt splice 88 per cent. The joints were tested also under transverse loading and the curve of deflection made from this series of tests shows the straight 5 x 9 in. sill on supports 7 ft. spans, deflected only ½ in. under a load of 21,000 lbs. without showing a sign of failure. The scarf splice deflected 1 in. under a load of 12,000 lbs., while the butt splice required a load of 16,000 lbs. for 1 in. deflection. The curves for tensile tests show that the scarf splice began to fail under a load of 32,000 lbs., while the butt splice endured 40,000 lbs. before showing signs of failure. Of course the additional tensile strength here shown is due to the shear resistance of the bolts used for the side plank, and separate tests of the butt splice with and without the side plank were made to show the value of its increased resistance.

THE ANTICS OF RAILWAY TAXATION.

The decision of the Supreme Court of the state of New Jersey in the case of the railway terminal taxes on properties in Jersey City and Hoboken is at once a text and object lesson in the antics of railway taxation. Stated with the utmost brevity, New Jersey taxes for her own benefit railway franchises. Assessments were levied on the terminal properties based upon their enhanced value as owning railway franchises; that is to say, in effect, their use as railway terminals. The court holds that their taxable value is their absolute market value minus any franchise or charter value, and that to tax franchises once in the state of New Jersey and again at Jersey City and Hoboken is double taxation. To the laical eye the proposition looks as plain as that twice one is two. Yet it has been a matter of costly and vexatious litigation; and, what is worse, it symbolizes inequities of railway taxation all over the country, which cannot be reached by law, or, at least, are not reached yet and where the double taxation is just as clear as that asserted by the New Jersey tribunal.

It has been said with truth that, taking the country through, there is hardly a tax device invented by the wit of man that has not been tried on the railways, and many of them remain in one state or another. There are taxes direct, and taxes indirect; taxes on plant, taxes on equipment, taxes on traffic; taxes on stock and taxes on bonds and other debt; taxes on gross income, taxes on net income; state taxes and local taxes; taxes which the state collects and holds; other taxes which the state collects and distributes to localities, and taxes which the localities collect and hold. There is no system, no consistency, no theory even, except as that theory may here and there be crudely localized to a state. Sometimes we find the railway treated on the basis of a "going" and prosperous concern whether it is so or not, and sometimes as though it were a mere plant in the nature of a land value —that is say, by a kind of market realty value. And, again, as in New Jersey, we find that vague and indefinite factor expressed by "franchise" separated as a tax objective; and, yet, again, such a system adopted, based on market value of the securities of a railway corporation, that the franchise is taxed as a component in the appraisal.

If these anomalies were limited to state bounds, that is to say, were intrastate, there would be, or might be, redress as in the New Jersey case just decided. Courts and even legislatures could be looked to to straighten out the crooked or ambiguous statute. But taxation is interstate and on a large scale. Railway securities, as well as other securities, cross state lines in an immense volume and have done so more and more as railway consolidation has advanced, and the local railway line become part of a big system. Right there is the rub of double and unjust taxation. For example, in New Jersey itself, take the Morris & Essex railway. It is taxed both as to property and franchise in New Jersey. The Connecticut holder of its shares is not taxed on them, but is taxed

as a holder of its bonds. Why should there be such a Connecticut distinction when equally stock and bonds express valuation and their original proceeds built the road; and why should either be taxed extrastate when the property itself has been sweepingly taxed intrastate? Is it not double taxation as conspicuous and flagrant as in the New Jersey terminal case, but without its remedy? That the Morris & Essex happens to be a lucrative bit of property under lease has obviously nothing to do with the principle or the practice; nor is any double taxation a normal consequence when a railway crosses state lines, for its taxable ratios are then easily enough adjusted, so far as they relate, at any rate, to duplication.

As a general result, therefore, we have, in the country as a whole, a startling degree of double railway taxation. The railway corporations are taxed fully, then the railway security holder is taxed again, unless he is a versatile tax dodger at the expense of self respect, conscience, or both. And the state or municipal treasuries harvest the unjust benefit. Yet at the very time that they are the beneficiaries of so unfair a system we see them loading the railways with fresh taxes, the full extent of which will not be realized until we get complete returns from the new assessments of 1907 and 1908. Nor, as stated, is the redress in sight. The extrastate tax in its duplicated form falls directly on the individual security-holder, and he is not apt to be a litigant. The railway corporations have not yet risen to the fact that the case of the individual security-holder is also their own as a drag on their borrowing power expressed in the higher interest rate which the corporation must pay. There are no statistics to depict in striking tabulations and totals the sums of these duplicated taxes; and the interstate commission has enough to do without any excursion into the medley of interstate double taxes, even had it authority. It is only now, then, and with a localized and limited luminosity that we get on taxation antics a little sidelight as in the New Jersey terminal case.

To such vagaries of state taxation is added now as a novelty—to use a mild term—the proposed and probable federal tax of 2 per cent. on dividends incorporated in the new tariff bill. It is true that the federal tax is not limited to the railways, and may be described, perhaps, as an additional rather than a double tax, though the distinction is a somewhat fine one. But it is unique as subverting the theory that states alone may tax corporations in return for the privileges and exemptions granted them as distinguished from partnerships. Corporations are creatures of the states and have been taxed as such. The big hand and far-reaching arm of federal authority now drags them into its own tax jurisdiction. The change may be good or it may be bad. But whether good or bad in its finalities no one can deny that it is radical in character; that it points straight in the direction of enlarged federal power, and that, in the case of the railways, a new impost is added to taxes already exorbitant—a result not the less trying to railway managers because it is so familiar.

NEW PUBLICATIONS.

Preservation of Timber. By Samuel M. Rowe, M.Am.Soc.C.E. Pettibone, Sawtell & Co., Chicago. 402 pages; 4 x 6¼ in.; 79 illustrations; leather.

This is the second souvenir edition of this handbook, the first souvenir edition having been issued in 1900. It has been revised and the scope of the subject matter somewhat broadened. Different processes are fully described so as to explain the principles involved, the properties of the chemicals and the character of the woods treated, as well as the practical details of operation. The book is intended to be used as a handbook and guide during the construction and operation of a plant. Most of the matter is original with the author and his collaborator, the late Robert D. Rowe, but this is supplemented with articles by a number of well-known experts and various reports on particular plants, tests, etc., by railway men and others.

Modern Cement Sidewalk Construction. By Charles Palliser. New York: Industrial Publication Co. 64 pages; 5 x 7 in.; 9 illustrations; cloth. Price, 50 cents.

The book is a guide to the laying of cement and concrete sidewalks that can be used by those who are somewhat familiar with the methods of mixing and using concrete in other places. It tells of the tools that should be used; the methods of selecting material and the qualities that are needed for sidewalk construction, and then enters rather fully into the methods that should be followed in order to obtain good results. Various methods of coloring and specifications that have been used are given, together with a few simple means of testing cement for quality. The author evidently does not believe in cheap work, as he devotes several pages to a statement of cases where cheapness in first cost has given the usual result of greater cost in the end, coupled with an unsatisfactory condition generally. The book closes with a rather full index referring to the items that have been considered in the text.

Letters to the Editor.

THE SPOKANE CASE.

Tucson, Ariz., June 25, 1909.

To the Editor of the Railroad Age Gazette:

One of the most humorous of the Uncle Remus stories is that in which Brer Rabbit played the part of rainmaker. Its philosophy would serve the commercial world to-day better than much of the agitation about rate adjustment.

Brer Wolf of Colorado, Mr. Burro of Arizona, Mr. Sheep of Utah, Brer Bear of California, Mr. Badger of Nevada and Brer Fox of Spokane have appealed to Brer Rabbit to make it rain. They have paid their toll and he has assured them that he will make it rain when they decide on how much they want.

And they are deciding.

Mid-afternoon will come and find the convention on the hillside still in session.

G. C. WHITE.

THE TRAVELER IS HEARD FROM.

Chicago, July 10, 1909.

To the Editor of the Railroad Age Gazette:

We note your very commendable article in this week's paper on the Canal street station, Chicago, and trust you will not let up, in any respect, in your campaign on this structure until such time as the railways interested recede from their indifference and evince a disposition to at least consider the matter.

According to recent press despatches, the president of the Pennsylvania Lines is playing golf in New Jersey this summer, the vice-president of the Burlington is in Texas berating the people for passing laws which compel railway men to attend to business, the president of the Chicago, Milwaukee & St. Paul is being entertained by the citizens of Fort Missoula, Montana, and the president of the Chicago & Alton is very busy on an outer harbor project at Topolobampo, Mexico. They, no doubt, will soon all be at home and come out with another series of articles lambasting the public for unfair and drastic legislation.

Being a constant traveler, and seeing things on railways from the cupola of a way-freight caboose and not from the tail end of the observation car, now that you have given us a little encouragement we shall from time to time call your attention to a few things that aggravate the people and compel them to take a firm stand with the railways.

ARKANSAS TRAVELER.

Contributed Papers.

AN INTERESTING DRIVING AXLE FAILURE.*

The failure of the locomotive driving axle reported herewith is interesting and somewhat unusual, being a case of an axle failing because of a crack developing internally, and probably also instructive as showing some of the precautions that seem to be necessary in selecting billets from which axles are made. It was a crank axle of a balanced compound Atlantic type engine with an original diameter of 9½ in. The axle was applied at the West Burlington shops, Chicago, Burlington & Quincy, May 25, 1906, and broke while engine 2,706 was hauling a passenger train on July 29, 1907. The break occurred in the middle of the journal under the left driving box. Fig. 1 is from a photograph of the fractured surface,

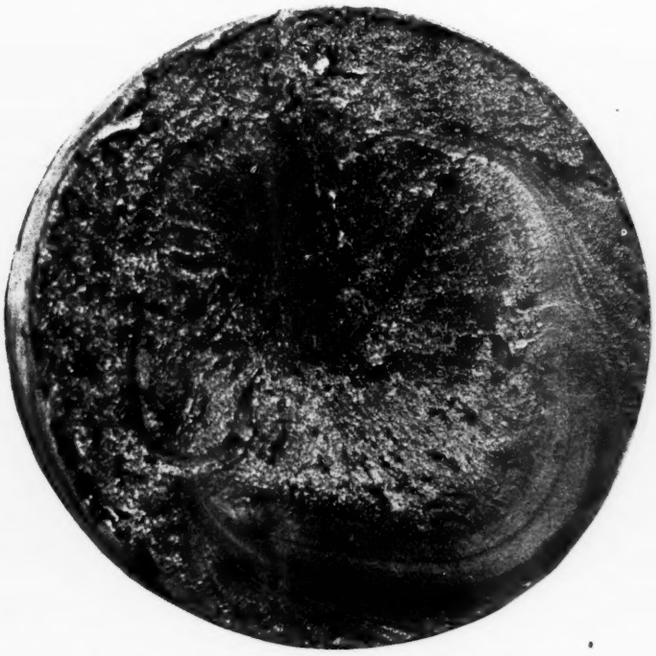


Fig. 1—Fractured Surface of Broken Axle.

Fig. 2—Etching of Section Near Fractured Surface.

from which it will be noted that the old crack existed very largely inside of the axle; and it would seem not improbable from the looks of the fracture that the crack first started inside, continuing both outward and inward, although the point of the beginning of the fracture seems to be uncertain. An analysis of borings taken near the point of fracture at the outside of the axle showed the following results:

Carbon	0.53 per cent.
Phosphorus	0.036 "
Sulphur	0.011 "
Manganese	0.43 "

This analysis is normal for driving-axle steel, although perhaps the carbon is a trifle high. An etching of the section near the point of fracture is shown in Fig. 2. This shows sound material, with no indication of piping, but the center portion is seen to consist of very large crystals, some of them ¼ to ⅜ in. long. This would seem to indicate that the billet was rolled from the ingot before the steel had a chance to solidify in the center, leaving the process of crystal formation to go on even after the work of rolling the billet had been finished. The figure shows definitely that later, when the billet was forged into an axle at West Burlington, the work of forging affected the metal to only a short distance, averaging not much over one inch from the outside. We had intended making a full examination of the main portion of the axle, but unfortunately this had been scrapped by the time we finally decided to make this examination. It seems evident that in forging there was a rectangular core that was but little affected by the hammer, which left severe forging strains, which latter resulted in the internal crack. Fig. 1 shows this crack to have a roughly rectangular shape, indicating the location of the strains.

It has frequently been urged that in buying billets for forgings, it is only important to know that the chemical composition of the material is satisfactory and that the process of forging afterward furnished the necessary work to produce suitable physical properties in the finished forging, and the author has been somewhat partial to this view. This experience, however, seems to show fairly definitely that it is important to have the necessary physical qualities in the billet before the forging is made and it would seem advisable, therefore, to make physical tests of the billets, obtaining the test piece by means of a hollow drill or otherwise.

*From a paper presented by M. H. Wickhorst, Engineer of Tests, C., B. & Q., at a meeting of the American Society for Testing Materials, Atlantic City, N. J., June 30, 1909.

NEW PULLMAN TRAIN-DE-LUXE, LONDON, BRIGHTON & SOUTH COAST.

The accompanying photographs are of a Pullman train, the "Southern Belle," which the London, Brighton & South Coast put into service on November 1, 1908, between London and Brighton. The great success of the Sunday Pullman Limited train since its inauguration in October, 1908, the completion of the new Victoria station, the widening of the line as far as Three Bridges and an improving Brighton traffic have induced the directors of the London, Brighton & South Coast to run daily this most luxurious Pullman car train between Victoria and Brighton. The train makes the trip in each direction in 60 minutes.

The train consists of seven Pullman cars, vestibuled throughout, and provides seating accommodation for 219 persons. It comprises a buffet car and six parlor cars, two of the latter having the guards' compartments. Each car measures 63 ft. 10 in. long, 8 ft. 8¾ in. wide and 13 ft. 6 in. high from rail to top of roof. Each is fitted with an independent hot-water heating apparatus and a complete installation of electric bells, also with Stone's improved systems of electric lighting and ventila-

tion, which also combines a new and improved device for heating by warmed fresh air, freed from all impurities, through ventilating ducts. The train has already secured an enviable reputation on account of its beautiful riding. It is fitted throughout with Laycock's automatic coupling and vestibule.

All raised wood carving has been eliminated, and all unnecessary projections of mouldings and cornices have been carefully avoided.

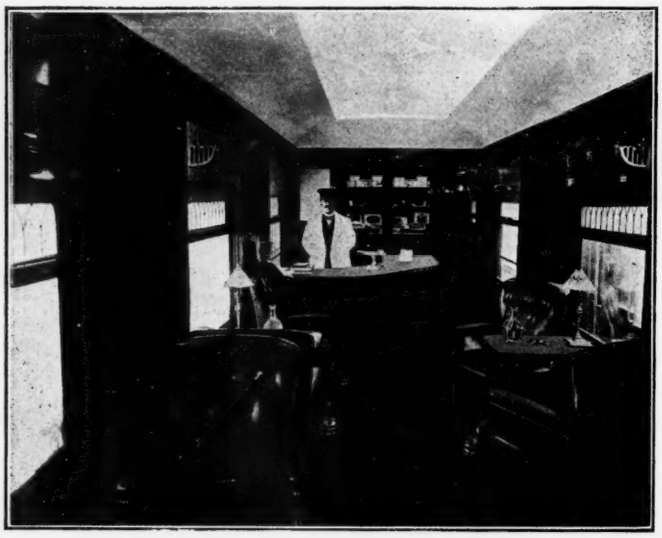
The buffet car Grosvenor will seat 25 persons. The style

Parlor Car Alberta.

adopted is that of Adams, and the woodwork is of the finest Spanish mahogany, richly inlaid with satinwood. The panels have a banding of stripe veneer, and are surrounded with a flat panel moulding inlaid with a repeating design in satinwood. The friezes and cornices are richly inlaid, as are also the pilasters with their fluted inlays, husks and water leaves. The dado is also inlaid. The easy chairs and settees are upholstered in a beautiful tone of green morocco, cool and restful to the eye. The pile carpets are in shades of soft green with design of fleur de lys in colors. The blinds are of a rich damask silk also in shades of green. The prevailing notes in the scheme of color are therefore the rich mahogany color of the woodwork contrasted with the green carpets, blinds and seat coverings. There is a buffet counter for serving, and a commodious pantry attached.

The parlor car Cleopatra will seat 33 persons. The style adopted in this car is that of Pergolesi. The wood is of the finest East Indian satinwood, with richly quartered panels inlaid with grey sycamore, boxwood, greenwood and tulipwood. The panels, pilasters and friezes are profusely decorated with motifs based on the exquisite forms invented by Pergolesi in the latter half of the eighteenth century. The easy chairs and settees are upholstered with a closely-woven fine Mohair velvet of fleur de lys design in shades of blue with a delicate tracery of gold showing through the velvet pile. The blinds are of the same color in rich damask silk and the pile carpets are in shades of deep rose color.

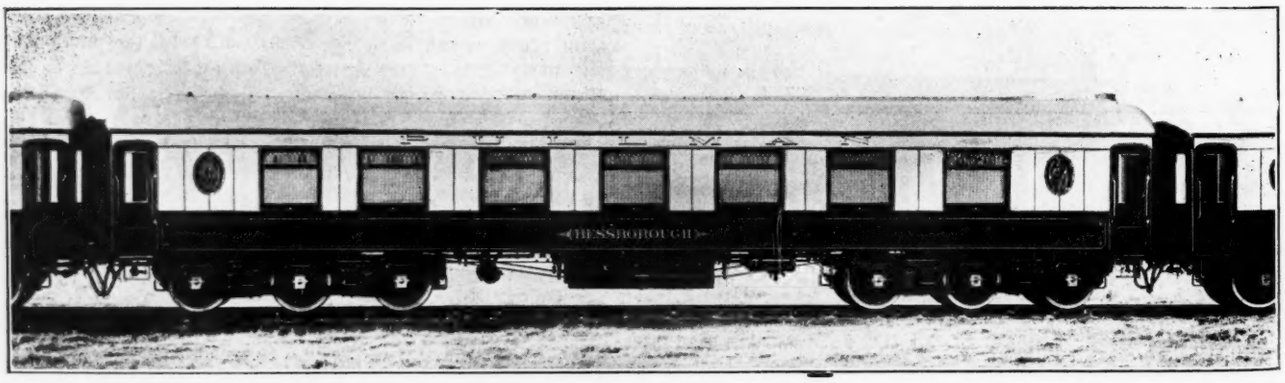
The Bessborough car, named after the chairman of the railway, will seat 33 persons. The style adopted in this car is that of Adams and is decorated with paneling made from a



Buffet Car Grosvenor.

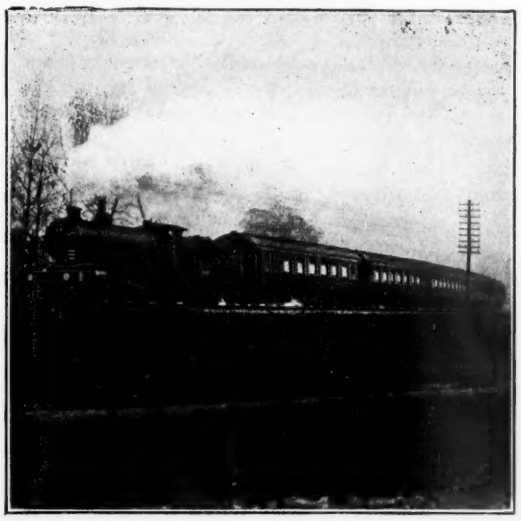
rare and fine quality of stripe mahogany used in conjunction with kingwood and satinwood. The panels are treated with an inlaid trellis design of kingwood, and the spaces are filled in with the stripe veneer running alternately in vertical and horizontal lines, producing an altogetner novel and charming effect. The mouldings, pilasters, friezes and cornices are all inlaid with satinwood. The carpets, blinds and other accessories are similar to those used in the Grosvenor car. The seats and easy chairs are upholstered in a fine quality of French drab cloth of a similar tone to that in use in the saloons of the Chemin de Fer du Nord.

The parlor car Princess Helen will seat 33 persons, and is

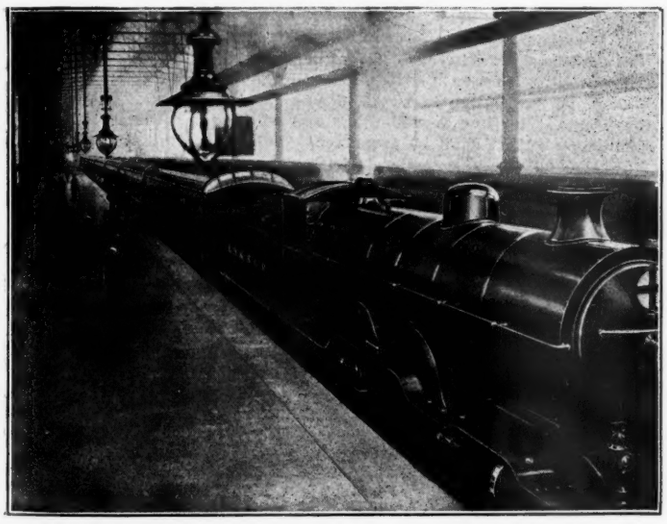


The Parlor Car Bessborough.

decorated in the same style as the Bessborough car. The groundwork is also in mahogany, but in this case the panels are composed of a rich plum-pudding mahogany. No other name is known for this beautiful wood which has received its cognomen because of its curious plum-like markings. The panels in this case are banded with kingwood, which is a striped wood of a purple color. The pilasters, friezes, mouldings, etc., are all richly and tastefully inlaid. The carpets, blinds, and other accessories are the same as in the Bessborough car. The seats and easy chairs are upholstered in a dainty green and drab-striped moquette tapestry.

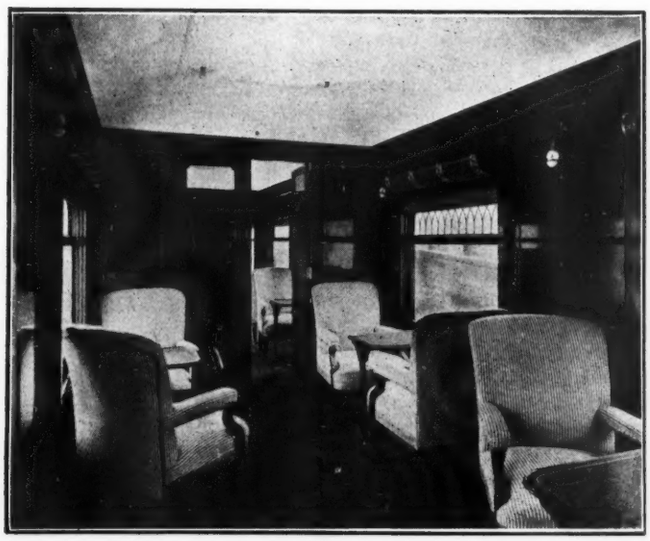


En Route to Brighton, Nov. 1, 1908.



In the Station at Victoria.

The parlor car Belgravia will seat 33 persons. It is paneled with richly marked pear tree with holly inlay, and is treated in the Pergolesi style, the main features being the beautifully inlaid panels of festoons, draperies and flowers, the general effect being that of ivory on the rich browny-pink wood. The frieze moldings, etc., are all inlaid. The sofas and chairs in this car are upholstered in a fine blue piqué velvet. The blinds are of rich damask of the same color, and the pile carpets are of rich shades of deep rose in self color.



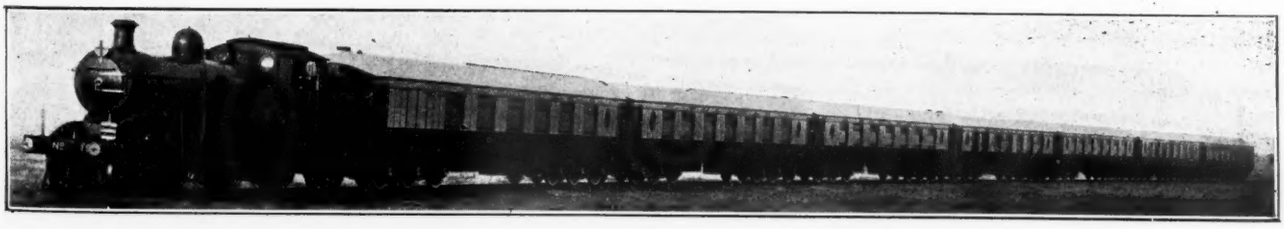
The Parlor Car Princess Helen.

The Alberta car and the Verona car will accommodate 31 persons each, and being finished in oak called for a treatment different from that of the cars already described, and the style of the French Renaissance has been introduced with highly satisfactory results. The wood is of the finest procurable wainscot oak beautifully figured, and is inlaid with rich decorative panels, moldings, pilasters, and friezes of hollywood slightly shaded to give the feeling of bas-relief. The ceilings, wall brackets, basket racks, and door mountings have all been specially designed and modeled, in order to retain purity of style. The easy chairs and sofa coverings are of a fine Mohair velvet of a light café color. The carpets and blinds are in shades of green with self colored designs.

The seven cars comprising the train were built by the Metropolitan Amalgamated Railway Carriage & Wagon Co., Ltd., Staltley, Birmingham. The entire scheme of decorations was designed by G. F. Milne, and carried out by Messrs. W. S. Laycock, Limited, Victoria Works, Sheffield. The whole of the equipment of the train has been under the direct supervision of Thomas Powell, Secretary and Manager of the Pullman Car Company.

ANNUAL MEETING OF THE FREIGHT CLAIM ASSOCIATION.

The eighteenth annual session of the Freight Claim Association was held at Old Point Comfort, Va., June 17, 18 and 19, President D. Mowat (T., P. & W.) in the chair. About 200 members were present (out of a total membership of 354), the largest attendance in the history of the association.



Seven Car Pullman Train, "Southern Belle," London, Brighton & South Coast.

W. A. Garrett, chief executive officer of the Seaboard Air Line, delivered an address of welcome. Mr. Mowat, in his opening address, called attention to Loss and Damage Rule 40, which still needs revision. He introduced Prof. H. C. Adams, of the Interstate Commerce Commission; Comptroller Plant, of the Southern Railway, and J. M. Belleville, of the National Industrial Traffic League, whom he had invited to be present. Twenty-three members have been added and the association now represents 214,100 miles.

The president continued: "The Arbitration Committee has dealt with 397 claims during the year and all have been promptly handled. The work increases and soon we shall be unable to get three men, already burdened with their own work, to give up their spare time to this work. It has been necessary for me to appoint 64 special arbitrators. In doing so I endeavored to cover the territory thoroughly and to make no repetitions. I had in mind that this would give others than the arbitrators a pretty good idea of some of the things which the arbitrators have to contend with. In fact, one gentleman who had been appointed special arbitrator refused to serve because he could not send the papers back and ask for a complete investigation, which, in his opinion, should have been made before the papers were sent to him.

"The Review Committee has handled 25 claims. I appointed two special review arbitrators. The Appeal Committee handled 36 claims. I appointed 10 special appeal arbitrators. The Interstate Commerce Commission appears to be giving claim matters attention, with a disposition to enter into the subject to a greater extent in the future.

"At a conference held in Washington last March between Commissioners Clark and Harlan and a special committee of representatives of the Trunk Lines, the New England Lines, the Central Freight Association Lines and the Western Trunk Lines, for the purpose of seeking a modification of the rules governing reparation orders under informal complaints, etc., Commissioner Clark said:

" 'That it (the Commission) recognized that some roads whose practices had been, and probably would be, straightforward and unobjectionable, were perhaps made to suffer with others, but this was almost a necessity incident to any law or general rule; . . . that he had been impressed with the fact, disclosed in claim papers submitted to him, that the persistent shipper with a large tonnage got reparation claims through, after being declined on their merits. A threat of diversion of traffic caused the roads to submit claims to the commission for reparation orders, although clearly not willing to establish the rate for all shippers.'

"From this it should be evident that it does not need a prophet to foretell what will follow should concealed losses and damages receive the attention of the commission. Our rules should require affidavits in cases where they are necessary, even though reputable claimants be offended." * * *

Professor Adams said in part: "There ought to be closer relations between the Interstate Commerce Commission, charged as it is with far-reaching activities, and this association. It takes ideas somewhat long to crystallize at times, especially with bodies as busy as is that body, but ultimately it has come to that point where the commission has instructed me to report to them some practicable method of procedure by means of which their influence can be cast with your own in clearing out the many difficulties that arise in the settlement of all classes of claims. * * *

"The operating accounts have been in force for two years; the financial accounts will be promulgated shortly, and that completes, so far as the structure of accounting is concerned, the work of the commission in this regard. During the time, however, a great many other questions have arisen—questions which are not accounting questions—and I think I may say that in the activities of the commission during the last two or three years their attention has been turned more emphatically than ever before to what may be termed administrative duties and administrative functions. Now you gentlemen have the experience, and you know what the difficulties are, and the time has come when some form of co-operative activity might well be established between this association and the commission which would be advantageous to the carriers and would be helpful to the commission. * * * If it should meet the views of this association to enter upon a systematic investigation of the situation with a view of suggesting some feasible method of procedure I should regard it as a piece of very good fortune."

In pursuance of this suggestion the association elected a committee of twenty-six members to serve for one year and to be known as the Conference Committee of the Freight Claim Association. Following are the members: E. Arnold, George C. Arnold, H. C. Barlow, W. S. Battle, H. F. Bidwell, J. M. Brewer, W. O. Bunger, R. L. Calkins, C. C. Chace, S. D. Cowden, Thos. Eedson, J. M. Eedson, W. H. Hancock, W. J. Healy, J. J. Hooper, Robert Kirkland, A. A. Martin, Daniel Mowat, J. W. Newell, John Nichol, G. W. Perry, R. C. Richards, F. E. Shallenberger, R. Kemp Slaughter, W. L. Stanley and J. S. Tustin. There were considered in order, as stated below, reports of the following standing committees:

On constitution and by-laws, presented by W. H. D'Arcy, General Claim Agent, Canadian Pacific.

On loss and damage rules, presented by H. C. Barlow, Freight Claim Agent, Erie.

On overcharge rules, presented by R. Kirkland, Freight Claim Agent, Illinois Central.

On loss and damage and overcharge rules (joint), presented by H. C. Barlow, Freight Claim Agent, Erie.

On uniform blanks, presented by W. H. Hancock, Freight Claim Agent, Union Pacific.

On methods and topics, presented by W. H. Druse, Freight Claim Agent, Central of New Jersey.

Loss and Damage Rule No. 40, after lengthy discussion, was modified, so that the second paragraph reads:

"All claims for damage or for loss from a package not exceeding $20 shall be prorated from point of origin to destination, regardless of responsibility between carriers, on mileage basis, except when such damage or loss is due to wreck, fire or flood, or when the records at destination show line on which the loss or damage occurred. No further investigation shall be permitted. Subject to Ruling W-2. Minimum distance for any carrier to be ten miles. This rule to apply on all unsettled claims."

On account of the growth of the association and its work two special arbitration committees were appointed to serve during the ensuing year, to be known as special arbitration committee No. 1, and special arbitration committee No. 2, in addition to the regular arbitration committee. The review committee was abolished.

The following officers were elected for the ensuing year: President, J. S. Tustin, Missouri Pacific; First Vice-President, W. J. Healy, Atchison, Topeka & Santa Fe.; Second Vice-President, W. L. Stanley, Seaboard Air Line; Secretary and Treasurer, W. P. Taylor, Richmond, Fredericksburg & Potomac (thirteenth consecutive term).

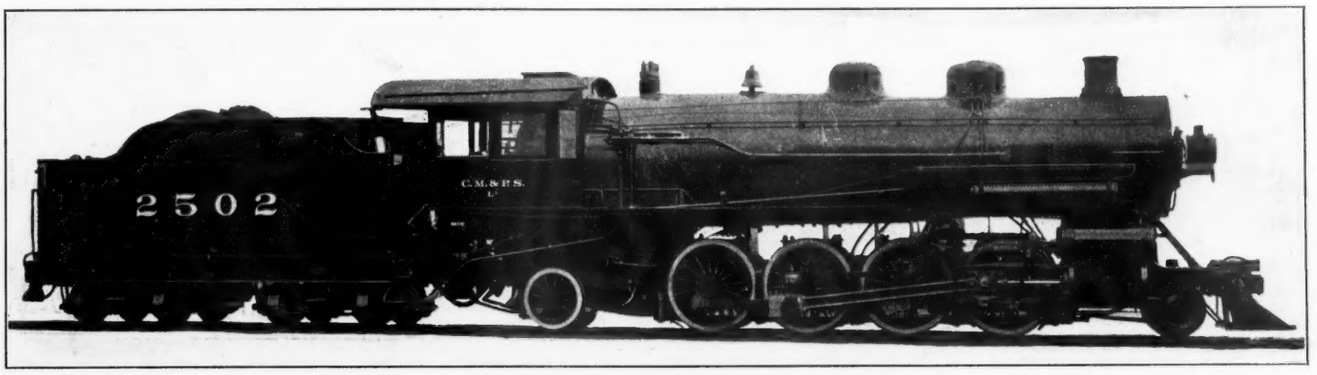
Arbitration committee, C. C. Arnold, chairman, Lehigh Valley; special committee No. 1, W. B. McKinstry, Central of Georgia; special committee No. 2, J. L. Eysmans, Cumberland Valley; appeal committee, J. J. Hooper, Southern Railway.

It was voted to hold the next annual session in California June 15, 1910, the place to be later selected by the California members.

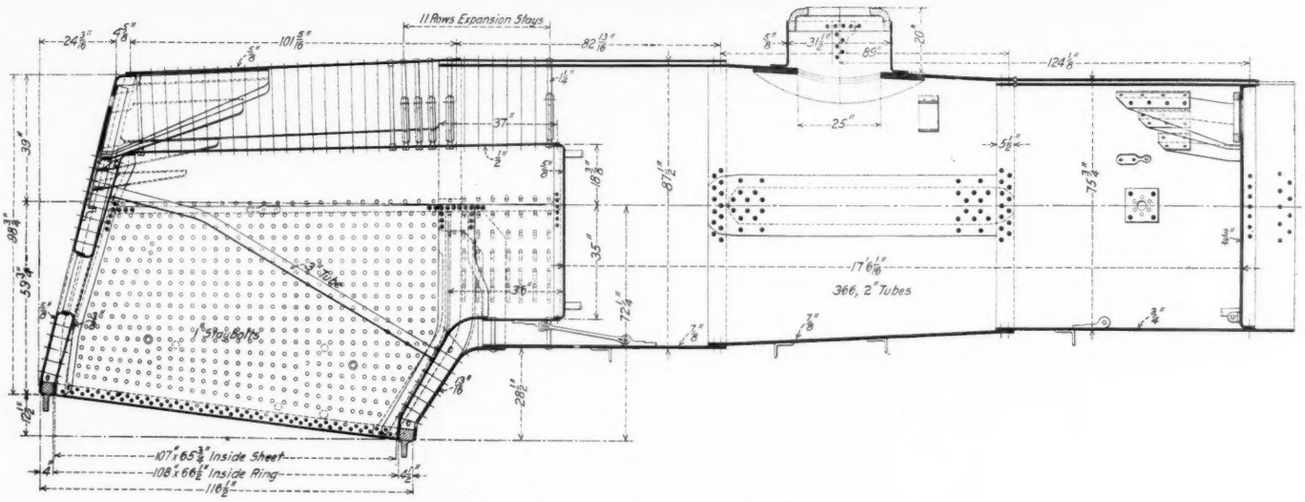
Brazil began building railways with the Spanish gage—5 ft. 6 in. Of this gage it has 1,012 miles, mostly built long ago, in the comparatively narrow plain between the sea and the mountains. Narrower gages have been built more recently, many climbing the mountains. Brazil has 9,460 miles of meter gage, 39 miles of 37-in. gage, 196 miles of 3-ft. gage and 499 miles 2-ft. 6-in. and 2-ft. gage. The railways are much isolated, extending from the ports south of the Amazon to the mountains, and in only one or two cases over them. The great coffee plantations are on the mountains.

MIKADO LOCOMOTIVES FOR THE CHICAGO, MILWAUKEE & PUGET SOUND.

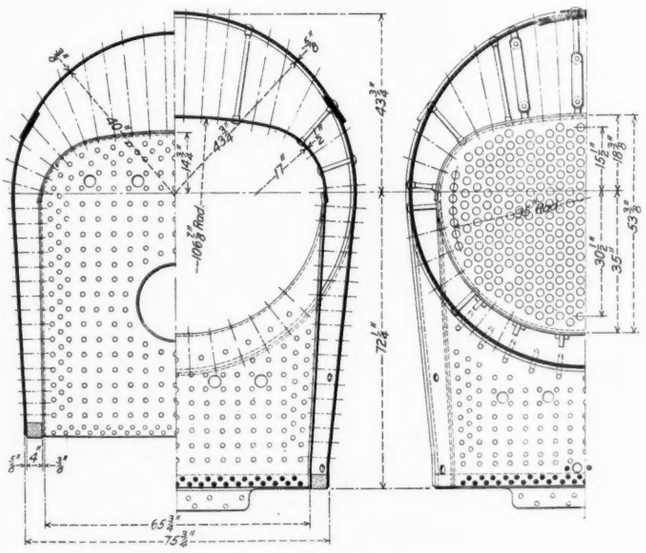
The Chicago, Milwaukee & St. Paul has just completed, at its Milwaukee shops, 20 mikado locomotives for service on the Chicago, Milwaukee & Puget Sound, and we illustrate them by the general plans and photographic side elevation. These locomotives have cylinders 24 in. x 30 in.; driving wheels, 63 in.; weight on drivers, 201,000 lbs.; tractive effort, 46,630 lbs. The boiler is 75¾ in. in diameter in front and 87½ in. at the throat sheet. The firebox is 65¾ in. x 107 in., and the tubes 17 ft. 6 1/16 in. long, the total heating surface being 3,614 sq. ft. The boiler has a combustion chamber 36 in. long and the firebox has the side sheets straight, but inclining outward slightly from the bottom. The mud-ring at the side is 4 in. wide and the water space along the center line of the boiler is 6½ in. wide, and the incline of the side sheet from the vertical at the center line of the boiler is about 5 in. The crown sheet turns from this point on a 17-in. radius and the crown stays are 1 in. in diameter, spaced 4¼ in. centers.



Mikado Locomotive for the Chicago, Milwaukee & St. Paul.



Part Sectional Elevation of Boiler.

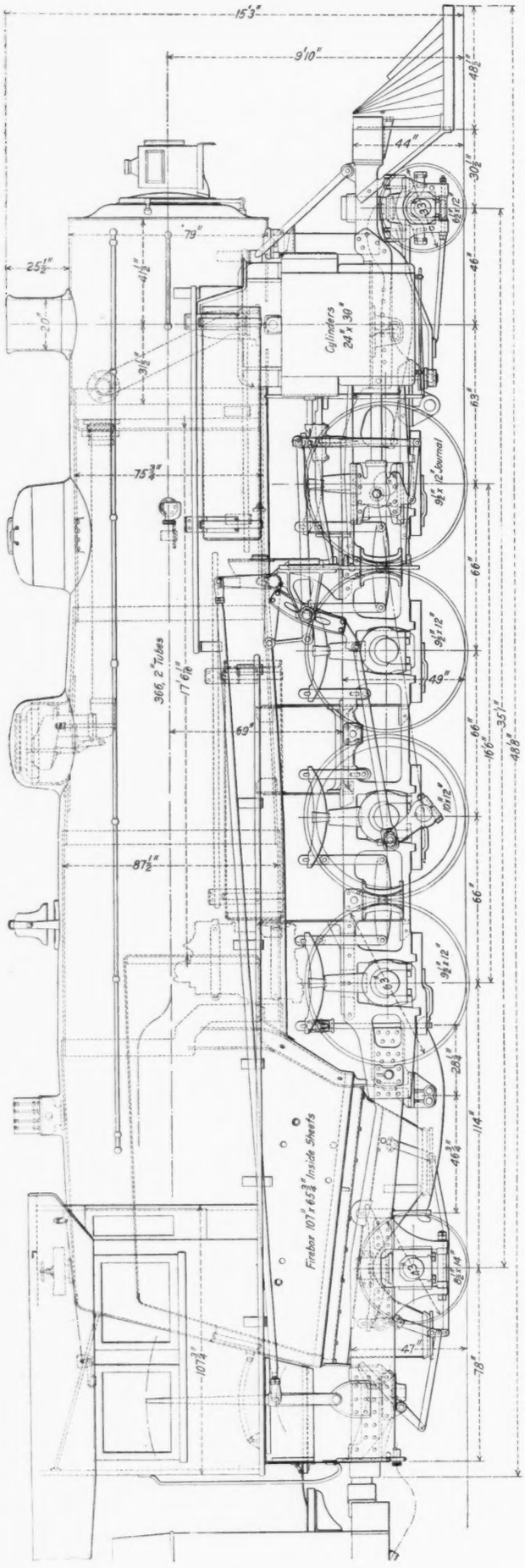


Boiler Details of Mikado Locomotive.

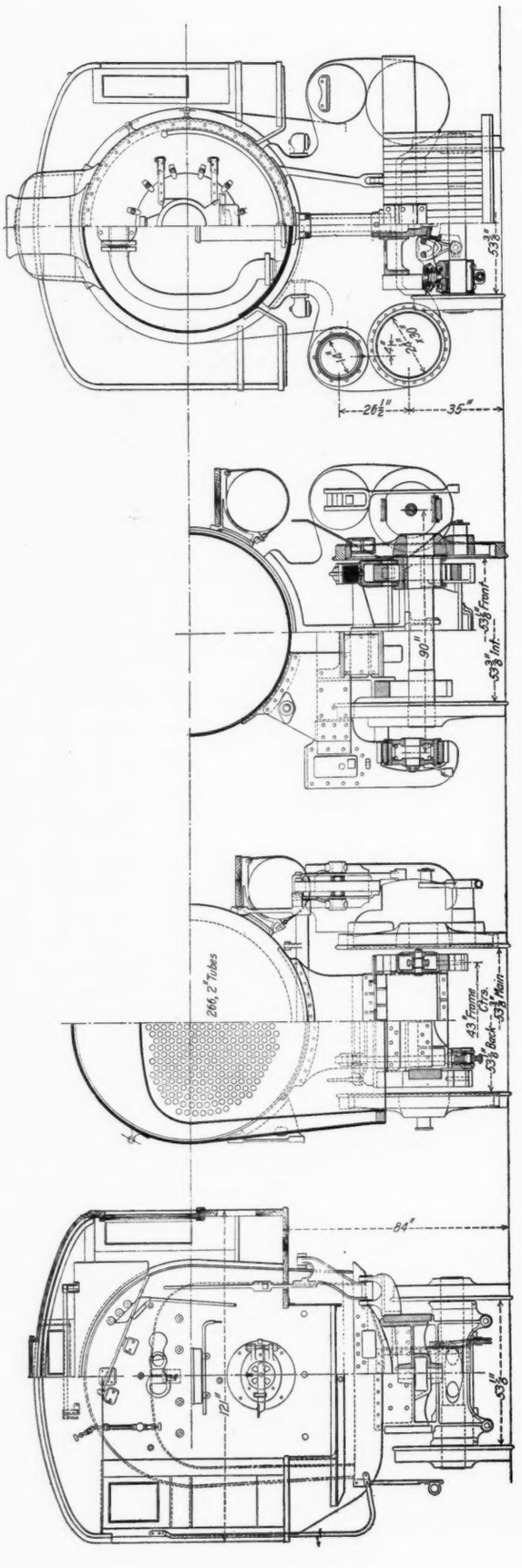
The change in the inclination of the side sheets of the firebox, giving them an outward slope instead of an inward slope, as in general practice heretofore, has been due to the fact that the side sheets of fireboxes which incline inward burn out in a very short time, while experience with those which incline outward has shown that they have a much longer life. The experience of the St. Paul in this direction has been so definite that all its new locomotive equipment is built with fireboxes shaped as above described. The locomotive has 14-in. piston valves operated by the Walschaerts valve gear. The trailing truck is arranged with roller bearings for lateral movement and is the De Voy type, which we have already illustrated.

The locomotives are intended for heavy mountain service, and it is expected that two of them will handle 1,500 tons over a 2 per cent. grade. It is also expected that they will handle heavy passenger trains over the mountains at a fairly good speed. Some of the engines have been already in service, and they have met the expectations of the designers in every respect.

The locomotives were designed by J. F. De Voy, Mechanical Engineer, under the direction of A. E. Manchester, Superintendent of Motive Power, and we are indebted to them for our



Elevation of Mikado Locomotive for the Chicago, Milwaukee & St. Paul.



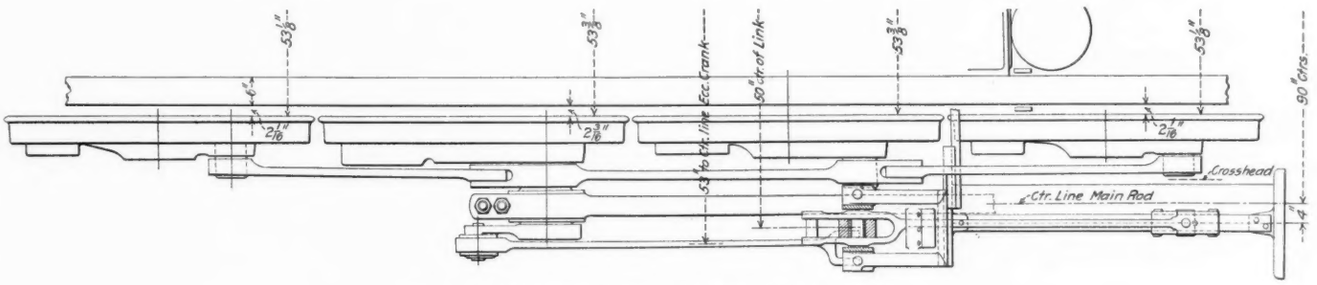
Sections and Elevations of Mikado Locomotive.

illustrations. The principal dimensions and ratios are as follows:

Cylinders	24 in. x 30 in.
Diameter, boiler shell	75¾ "
Steam pressure	200 lbs.
Firebox	65¾ in. x 107 in.
Tues	366, 2-in., 17 ft. 6⅛ in. long
Heating surface, tubes	3,332 sq. ft.
" " arch tubes	29 "
" " firebox	188 "
" " combustion chamber	65 "
" " total	3,614 "
Grate area	48.8 "
Journals, main driving	10 in. x 12 in.
" front, back and intermediate	9½ " x 12 "
" trail truck	8½ " x 14 "
" engine truck	6½ " x 12 "
" tender	5½ " x 10 "
Wheel base, rigid	16 ft. 6 "
Total wheel base of engine	35 " 1 "
Total wheel base of engine and tender	65 " 7¼ "
Weight on driving wheels	201,000 lbs.
" " leading truck	25,500 "
" " trail truck	34,000 "
" total, engine	260,500 "
" of tender	154,000 "
" total engine and tender	414,500 "
Tank capacity	8,000 gals.
Coal capacity	14 tons

$$\frac{\text{Weight on drivers}}{\text{Tractive power}} = 4.31$$

$$\frac{\text{Total weight}}{\text{Tractive power}} = 5.80$$



Plan of Rod Arrangement, Mikado Locomotive.

$$\frac{\text{Tractive power x diameter drivers}}{\text{Heating surface}} = 812.80$$

$$\frac{\text{Total heating surface}}{\text{Grate area}} = 74.00$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 7.80^*$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 55.62$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 72.21$$

$$\text{Volume of both cylinders, cu. ft.} = 15.70$$

$$\frac{\text{Total heating surface}}{\text{Volume of both cylinders}} = 230.19$$

$$\frac{\text{Grate area}}{\text{Volume of both cylinders}} = 3.10$$

*Per cent.

The Russian exports of pig iron in 1908 were 9,344 tons, against 72,384 tons in 1907, and the exports of iron and steel and manufactures thereof in 1908 were 92,937 tons, against 146,952 tons in 1907. Of the 441 tons of cars exported, 348 tons went to Austria and 93 tons to Roumania. The principal countries to which the exports went in 1908 were as follows, in tons: Pig iron—Italy, 4,848; Austria, 2,544; Germany, 912; United Kingdom, 672. Raw iron and steel—United Kingdom, 22,672; Roumania, Turkey and Bulgaria, 21,936; Italy, 6,928; Germany, 2,224; Austria, 1,568; Netherlands, 880. Iron and steel and manufactures thereof—Germany, 832; United Kingdom, 224; Austria, 144; Roumania, Turkey, and Bulgaria, 132; Italy, 128.

THE USE OF ALTERNATING CURRENTS IN RAILWAY SIGNALING.*

II.

Having now spoken of the relation of the reactance bond to the propulsion current, let us consider it with reference to the alternating signal current.

If an alternating current is caused to flow through a reactance bond from rail to rail it will encounter a resistance many times higher than that of the copper. For example, the ohmic resistance of the New York Central bonds from rail to rail is about .00028 ohms, not including the leads to the rails, whereas the impedance or resistance to 25 cycle alternating current is .055 to .06 ohms each, or about 200 times higher than the ohmic resistance.

The reason for this is as follows: Whenever a current is caused to flow through a coil, especially when wound around an iron core, a strong magnetic field is produced which in becoming established produces a counter electro-motive force in the coil which opposes the impressed voltage and delays the building up of the current. If now, this current is caused to alternate many times a second, it will never have a chance to build up to its full value, i.e., as represented by a constant voltage divided by the ohmic resistance; hence the apparent resistance of such circuit, i.e., the a.c. voltage divided by the a.c. current, will be many times higher than a direct current voltage divided by the resulting current. The greater the mass of iron or the greater the number of the turns, or both, the more will be this apparent impedance. Furthermore the impedance increases with the frequency. For example, if a bond has an impedance of .06 ohms at 25 cycles, it will have an impedance of about .14 ohms at 60 cycles.

Returning now to the bond, if a transformer is connected through a resistance to the rails as shown by Figure 3, it will send a certain amount of current through bond C and therefore, on account of the impedance of the bond, a difference of potential will be created between the rails, and a certain portion of the transformer current will be caused to flow down the rails and through the reactance bond D.

It is this current through bond D that produces the necessary voltage drop to operate the relay. As stated before, the impedance of an iron core is about .055 ohms at 25 cycles, therefore to produce sufficient voltage to operate a relay of the type shown, a current of about 6 amperes is required to flow through bond D which in so doing produces about .35 volt drop.

In order to send this current down the rails and through bond D, about 1.5 volts is required across the rails at the transformer for a 1,600-ft. track circuit. Now this voltage will send about 30 amperes through bond C, which, with the current down the rails, makes about 35 amperes to be delivered by the transformer for a track circuit of that length.

One not familiar with the peculiarities of alternating current might think a mistake had been made in saying that

*A paper by W. K. Howe, Chief Engineer of the General Railway Signal Co., read before the Railway Signal Association at New York, June 8.

35 amperes is the total current since 30 amperes flows in the bond C and 6 amperes down the rails. But this is not a mistake since alternating currents cannot be added up directly in this way unless the characteristics of the various multiple circuits are identical. For example, if there is more reactance in one branch circuit than in another the current in the first circuit will lag behind that in the second circuit with the result that when one current is high the other is low and vice versa, and therefore if ammeters are placed in the different branch circuits and their readings added the sum will not be the same as the reading on one ammeter placed in the common portion of the circuit.

A low resistance, R, is used to prevent short circuiting the transformer when a train is passing. Therefore to send the above current of 35 amperes through this resistance and through the track circuit requires about 3.5 volts at the transformer. Therefore, the total energy required per track circuit is 3.5 volts times 35 amperes, or 123 volt amperes.

Now, it is a characteristic of alternating current that when flowing through a circuit containing reactance, the true energy is not represented by the volts times the current, as in the case of direct current, but is always less. The amount that it is less is called the power factor. For example, we speak of the power factor of a circuit being 80 per cent., meaning thereby that the true energy is 80 per cent. of the volts times the amperes. The reason for the true energy being less than the apparent energy, or volt amperes, is that the current lags behind the voltage and therefore when the voltage is high the current is low and vice versa.

Coming again to the track circuit under consideration, the power factor of such a circuit is about 85 per cent.; hence the true energy delivered by the transformer is 85 per cent. of 135-volt amperes, or about 115 watts. Taking into consideration the loss in the transformer and the transmission line and including the energy delivered to the local winding of the track relay, a track circuit of this type 1,600 ft. long would require about 150 watts from the power house.

This may seem to you a very large amount of power in comparison with the very small amount taken by a steam road track circuit, but when it is remembered that it costs in the neighborhood of ten dollars a year for labor and material to keep the gravity batteries for a steam road track circuit going; and further, when it is considered that power can be developed and delivered for from 1.5 to 2 cents per kilowatt hour and therefore the cost of power for a 1,600-ft. track circuit of this kind is about $20 to $25 a year, the comparison does not look so bad.

Of course, if less unbalancing could be allowed, we could have more reactance in the bonds at the same cost and the power would be considerably reduced, or at considerably more expense we could produce bonds having a higher reactance with the same unbalancing; but taking it all in all, the bonds now being employed seem to be about right on the basis that minimum total cost results when the interest on the investment equals the operating expenses of a given system.

If anything, the bonds are too large, as they have never been known to overheat, even under maximum traffic conditions. This, however, is a matter that experience alone can demonstrate, as one cannot sit down and say that because a bond has such current capacity therefore it will do for a given traffic, any more than it would be proper for an engineer laying out an industrial establishment to say that because he has 100 h.p. in motors for driving his machinery, he will make his generating plant 100 h.p. also.

As a matter of fact, all the motors never run at full load at the same time, as experience has shown, and therefore certain percentages have been established for determining the sizes of generating plants for such purposes. It is something after this order that the size of bonds for electric traction purposes should be determined.

Track circuits of the type shown by Fig. 3 may be operated up to a length of about 2,000 ft. without undue energy consumption, .055 ohm reactance bonds being used with 100-lb. rail. For track circuits longer than this the center fed circuit, Fig. 5, may be used, this with the same bonds and size of rail, may be made 6,000 ft. long and over without undue energy consumption or the track voltage becoming too high; provided the railway company will permit the intervals between cross bonds to be a great as this.

It is to be noted in this type of circuit that no bond is used across the rails at the transformer and when it is remembered that in the 1,600 ft. end fed track circuit (Fig. 3) the energy end bond C took 30 out of the total of 35 amperes, one can

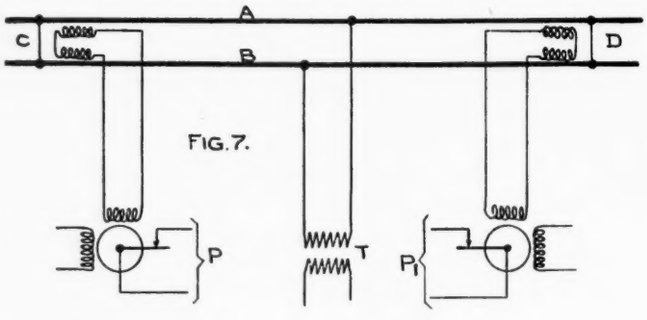


FIG. 7.

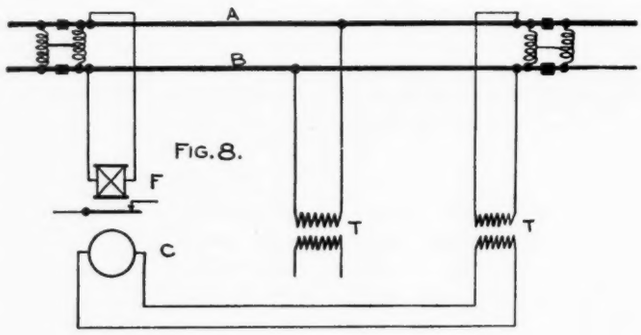


FIG. 8.

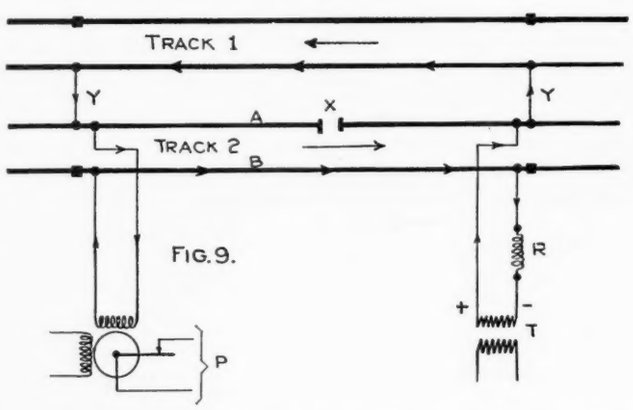


FIG. 9.

readily see what is the cause of so much energy consumption in an end fed track circuit and why it is possible to run such long center fed track circuits.

It is further to be noted that transformer T has nothing to do but feed the track circuit. This being the case, no resistance grid need be used between transformer and track to prevent an excess current flowing with a train at that point, since the transformer itself can be so designed that when an attempt is made to draw an excess current from it, its voltage will drop and thus prevent such an occurrence.

The question may be asked if center fed track circuits consume so little energy, why not use them under 2,000 ft. The answer is that such circuits require an extra relay, an extra transformer and one or more wires through the block, plus the proper share of common wire, since the signal must be

controlled through both track relays. The cost of this apparatus capatilized would about offset the saving in energy. Of course, you understand I am speaking in round numbers when I place the limit of an end fed track circuit of this type at 2,000 ft. since there are many conditions which would alter this. For a length of 2,000 ft. an end fed track circuit would take six to seven times the energy and for a 1,500-ft. track circuit about four times that of the center fed.

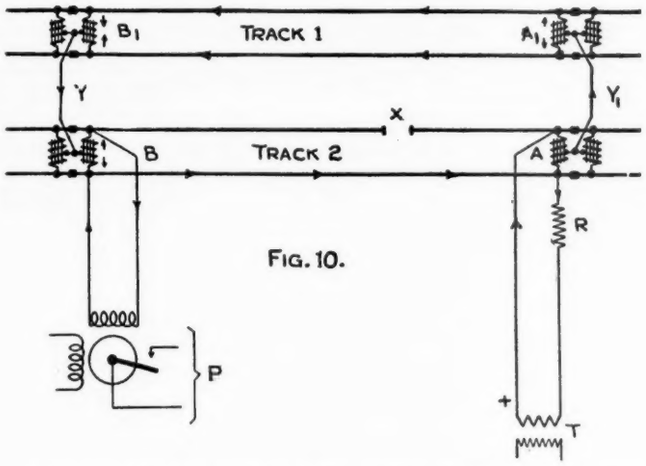


FIG. 10.

With the two rail type of track circuit employing iron core reactance bonds:

1. Track circuits of this type are especially adapted to heavy electric traction, or where the track circuits are very short and where broken rail protection is required. They may also be used on roads employing a.c. current for traction.

2. They are not well adapted for complicated track layouts, such as terminals and interlocking plants, on account of their expense and the size of the apparatus which must be located at the track and the runs of heavy copper cable necessary.

3. They are very stable track circuits. That is, they will stand very leaky ballast conditions without perceptible effect on the relay.

4. Broken rail protection is inherent in this type of track circuit.

5. End fed track circuits may be used up to about 2,000 ft. in length and center fed up to 6,000 ft. and over.

6. Cross bonding between tracks can occur only at the ends of sections.

Coming now to the type of Two Rail Track Circuit employing ironless reactance bonds as shown by Fig. 4. The bonds, as their name suggests, have no iron about them except what is in the enclosing case; they merely consist of a number of turns of heavy copper strip properly insulated. There being no iron in the core, many more turns must be employed to give the necessary reactance and therefore the copper cost runs up much higher than in an iron core bond for the same current capacity. Therefore bonds of this type are commercially practical only for roads running light traffic.

However, as bonds of this type are not susceptible to unbalancing effects, as are the iron core bonds, they may be made of high reactance with the result that end fed track circuits as long as 1½ miles may be used with a very moderate current consumption, and center fed track circuits as long as three miles. In fact, the writer has in mind an end fed track circuit, 8,800 ft. long, of this type which has given uniformly excellent service for some years.

Referring again to Figure 4, it will be noted that the bond (C) at the transformer end consists of a single coil connected across the rails in the usual manner, but that at the relay end the bond (D) has two windings, one connected directly across the rails to serve as the return for the propulsion current, and the other in inductive relation thereto for operating the relay. The object of doing this is to prevent an excessive direct current flowing through the relay because of the drop caused by the passage of the propulsion current. This is not required at the energy end because the transformer is designed to withstand such direct current as may flow through it.

Track circuits of this kind employing ironless reactance bonds may be connected in all respects like Figs. 3 and 5. That is, adjacent track circuits may be connected by center taps on adjacent bonds. When so arranged the secondary coil on bond D need not be used.

In the track circuit shown by Fig. 4, broken down joint protection is given regardless of the polarity of adjacent track circuits and will be explained later; whereas were the center tap method used for connecting adjacent track circuits, the proper polarities would have to be maintained.

1. This type of circuit is suitable for track circuits from one to three miles long where light electric traction exists, such, for example, as interurban work.

2. It is not subject to unbalancing troubles.

3. It is a very stable form of track circuit. As much so as, if not more than, the type employing iron core reactance bonds.

4. The continuous rails of each track may be cross bonded as often as desired.

5. When adjacent track circuits are connected by center taps on the bonds, broken rail protection is afforded on both rails.

In addition to the various types of track circuits thus far described, there are certain other types which are in use or have been tried experimentally some of which are shown by Figures 6, 7 and 8 and which I will briefly describe as follows:

Figures 6 and 7 show track circuits in which the sections are limited by conductors C and D instead of the usual insulated rail joints, energy being fed in at the center. In Fig. 6 the relay leads are plugged into the rails at a point 10 to 15 ft. from the limiting bonds C and D. The relay is operated by the drop produced when sufficient alternating signal current is caused to flow through the limiting bond and

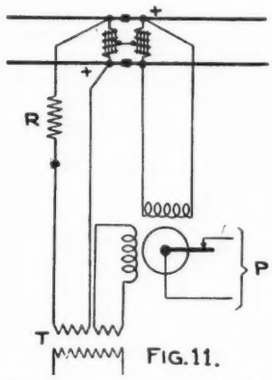


FIG. 11.

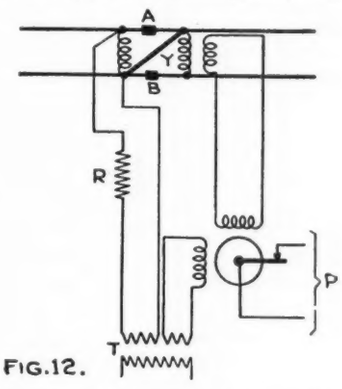


FIG. 12.

the short lengths of rail between said bond and the point where the relay leads are plugged into the rail. The track winding of the relays is made of low resistance and relatively large current capacity so that they will operate on a very low voltage.

The track circuit, Fig. 7, is electrically similar to that shown by Fig. 6, except that the relays are operated from secondary track coils placed so as to be in close inductive relation to the signal current in the rails instead of by direct contact with the rails as shown in Fig. 6. In both types, to secure strong operation of the relays, relatively heavy alternating currents must be sent down the rails with the result that on very long track circuits the voltage across the rails at the transformer will be very high.

Track circuits of this type have the advantage that there

are no insulated joints or reactance bonds required, and were this the only consideration there would be a very distinct advantage in their use. But the disadvantages more than outweight the advantages; to such an extent, in fact, that this type of track circuit cannot be considered practical for the following reasons:

1. Center feeding must be always used regardless of the length of the track circuit. Hence the need of an extra transformer and track relay, together with necessary wires running through the block.

2. By far the most important objection is the bad shunting characteristics possessed by this type of track circuit. As developed to date, in either type of track circuit, a light car can stand over one of the limiting cross bonds C or D with the likelihood that both relays would pick up and give a clear signal. This will be evident when it is remembered that to shunt the track circuit with a car at this point the resistance through the wheels should be less than the resistance of a few feet of rail plus that of the low resistance cross bond C or D. With a very heavy engine or car and with the track rails and wheels bright, the relays will probably hold down under this condition. But with a light car, and especially if the rails are dirty or the wheels in the same condition, the relays are likely to pick up. When, however, there are a number of cars, as in a train, the action of this type of track circuit is very satisfactory and it is a question for the railways to decide whether or not they wish to use it.

I do not wish to be understood as saying that this type of track circuit cannot be developed to a point where it will be perfectly safe under all conditions, as it is unsafe to make predictions in these times when so many revolutionary things are being accomplished; but at the present time it appears to be unsafe under the conditions mentioned above; namely with a light car standing over the cross bond.

Referring now, to the type of track circuit shown by Fig. 8, energy is fed in at the center, a single relay being used, of the double wound type. The field F of the relay is fed from one end of the track circuit and the armature C from the other end of the track circuit through the medium of a small step-up transformer. Track circuits of this type have the advantage that only one relay is required and the signal circuits do not have to be carried through the block. It is, of course, necessary, however, to carry the wires for the relay armature through the block. This type of circuit is in use on the West Jersey & Sea Shore Electric road.

Having thus far directed your attention mainly to track circuits for direct current electric roads, I desire now to consider them with reference to roads employing alternating current propulsion. As stated before it is necessary in such cases to employ a signaling frequency distinctively different from that of the propulsion current and to use relays responsive thereto but unresponsive to the propulsion frequency. Furthermore cases have arisen where in addition to the a.c. propulsion current foreign direct currents were also present in large quantities so that it became necessary to provide relays immune to both kinds of current.

With regard to track circuit it is desirable to use those having balanced bonds as in Figs. 3 or 5. In a.c. traction the propulsion voltage employed being very high the current is proportionately small and therefore the bonds can be made very much smaller with a consequently large reduction in cost. For example bonds for a 11,000 volt a.c. road need be only about one-eighteenth the carrying capacity of the bonds required for a 600 volt a.c. road for the same traffic; or assuming 1,250,000 circular mil bonds to be necessary for a given traffic, on a 600-volt d.c. road then No. 2 B. & S. wire could be used for a 11,000-volt- a.c. road for the same heating.

Aside from the foregoing observations and the fact that track circuits for a.c. roads take somewhat more power than for d.c. roads the remarks thus far made with reference to the two rail track circuits, for d.c. roads, employing iron core bonds apply in a general way to a.c. roads also.

Before concluding my remarks on a.c. track circuits I wish to mention their use in connection with steam roads. Where there are foreign currents they should be used. The type of track circuit used would be practically the same as that shown by Figure 1, except that no provision need be made as in the case of electric roads to prevent the heating of the relay or saturation of the transformer by traction current and on this account the energy per track circuit is a minimum. For example, a 6,000- ft. track circuit, end fed, can be operated on 15 to 20 watts. End fed track circuits of this type as long as 8,000 ft., and center fed track circuits up to 3 miles long will operate satisfactorily using the ordinary bond wires employed in steam road track circuits.

In speaking of iron bond wires it may be of interest to you to know that they more than anything else limit the lengths to which a.c. track circuits on steam roads may be operated. If copper bonds were used much longer track circuits could be operated.

It is, of course, obvious that no reactance bonds are needed on steam roads.

It is also interesting to know that where electrification in the future is contemplated if a.c. apparatus is installed for present steam operation it can be continued in use under electric operation by the addition of reactance bonds and by making some slight changes in the circuits.

INSULATED JOINTS AND BROKEN RAILS.

In steam road track circuits, where the rails of adjacent blocks are not connected to each other nor to parallel tracks, as in the case of electric roads, broken rail protection is given in the simplest possible manner, provided of course, that the relay is not receiving energy from the battery in the adjacent track circuits by reason of defective insulated joints. Barring this, the opening of the electric circuits by the breaking of a rail will, of course, cause the relay to open and set the signal at stop.

In electric traction, however, a very different set of conditions exists on account of the fact that "cross bonding" has to be employed so that the traction currents coming from a given car or train can distribute as quickly as possible to all the rails and thus return to the power house with the least loss. It can readily be seen that, were there no such connection the current from a train would have to traverse the entire distance to the power house on one set of rails only, except such as might leak through the ground. This would, of course, result in a very great drop of potential, especially with heavy trains, and would be felt to a very marked degree at the coal pile, to say nothing of the slow speeds which would result and the fluctuations of the lights in the cars when the train is started and stopped. It therefore becomes essential to use cross bonds.

This being the case, if a rail breaks as at X, Fig. 9, the current to the relay is not interrupted, but can flow, as shown, from transformer positive through cross bond Y, down one rail of track 1, through the other cross bond Y, through the relay and back by rail B to the transformer. It will thus be seen that with a broken rail as at X, the relay will not open.

Broken rail protection is, of course, given on the signal rail, B (the one which is given up for signaling purposes), but is not and cannot be given on the traction rail in single rail track circuits except at great expense. It is therefore not wise to use this type of track circuit where unlimited speeds occur. In Fig. 10, however, is shown a type of track circuit in which broken rail protection is inherent. This is the iron core bond type of track circuit, illustrated in Fig. 3.

Assume the tracks to be cross-bonded at Y and Y 1. If now, one of the rails breaks as at X, the current from transformer T, instead of flowing to the relay via the broken rail, will take the following path: Through one-half of bond A,

the cross bond Y 1, through both rails of track 1 and both halves of reactance bonds A 1 and B 1 in multiple, through cross bond Y, through one-half of bond B and through the unbroken rail of track 2 back to the transformer.

It will therefore be seen that the by-pass around the broken rail starts at the middle point of bond A and ends at the middle of bond B, and that therefore the voltage tending to send current through this by-pass is only half of the normal voltage across the rails at the energy end. Furthermore, the current which flows through this by-pass only goes through one-half of the relay bond B and therefore produces at the relay terminals one-half the voltage which it would produce were it to pass through the whole bond.

If the track circuits shown in Fig. 10 were 1,600 ft. long and the rails 100-lb. steel the resistance of the by-pass from the center point of bond A through half of bond B and back by the unbroken rail to the transformer would be about 65 per cent. of the normal path from one terminal of bond A down the rail now shown broken, through bond B and back to the transformer.

By combining the above facts it will be seen that the voltage across the relay with a broken rail will be approximately 40 per cent. of normal. Had three tracks been cross bonded with the one in question this voltage would have been about 45 per cent of normal.

Furthermore, returning to the two tracks illustrated, had cross bond Y been moved down the length of one track section, thus making the length of the by-pass very much greater, the voltage at the relay would have been about 25 per cent. of normal with a break at X.

To make a long story short, with a broken rail the voltage delivered at the relay will be less than 50 per cent. of normal, even with the least by-pass resistance possible, and will be less than this with long track circuits and with less cross bonding. Furthermore, if the tracks are cross bonded at every other location a much greater reduction in voltage at the relay will result than otherwise. Inasmuch as a.c. relays can be adjusted for a very high drop-away it becomes a comparatively simple matter to arrange them so that they will operate satisfactorily with the rails intact, but will open positively if the rail breaks.

Coming now to the matter of detecting a broken down insulated joint, Fig. 11 shows the adjacent ends of the two track circuits. It will be noted that the polarity of adjacent rails is opposite. (By mistake the negative polarity signs have been omitted.) With the type of relay shown, that is with one winding fed from the track and the other fed from a local source of energy, the relay will operate in one direction with a given polarity and will operate in the other direction if the polarity is reversed. Therefore, if either of the insulated joints should break down, the energy from transformer T passing across the broken down insulation and back through the central connection between the bonds, would cause the relay to open positively and thus set the proper signals at stop and caution. With relays which take all their energy from the track this will not hold good.

Referring now to the circuit shown in Fig. 12, this will be recognized as the type of track circuit illustrated in Fig. 4. By means of the diagonal cross bond Y if joint A breaks down, the transformer will be short circuited; and if joint B breaks down the relay will be short circuited. Thus the diagonal cross-bond Y acts as a shield between the two track circuits.

There are other methods of giving the indication of a broken down insulated joint, or preventing the giving of a false clear signal due to such contingency, but the methods as above described indicate in general how this can be effected.

Having now gone quite fully into the matter of track circuits in general, let us discuss some of the devices involved.

Taking first the track relay. There are two general types on the market, namely those in which all of the energy for operating them is taken from the track circuit and those in which the energy for operating them is taken partly from the track circuit and partly from a local source. The latter type is the one illustrated in connection with the various track circuits above described, with the exception of that shown in Fig. 8 which is a double wound relay, both members of which are fed from the track circuit.

The relays which take all of their energy from the track circuit have the advantage that they are somewhat less complicated. That is, it is not necessary to supply local energy for their operation. The supplying of this energy is, however, not a serious matter when it is remembered that energy will usually be available from transformers existing for other purposes in the vicinity of the relay. For example, it will be noted in Fig. 1 that the same transformer feeds both the local winding of the track relay and also delivers energy to the track circuit proper.

These relays have the disadvantage that they require a great deal more energy from the track circuit than do the double wound type and when it is remembered that the track circuit is, at best, an exceedingly inefficient system for the transmission of power, it is evident that more effect can be developed with the same amount of energy by sending a small amount of energy over the track circuit for operating the relay and supplying the bulk of the energy locally.

The double wound relays, that is, those which take energy both from the track circuits and locally, have the advantage that they will operate in one direction from one polarity and in the opposite direction from another polarity. This feature makes this type of relay very effective when it comes to indicating a broken down insulated joint as shown by Fig. 11.

With the polyphase type of relay shown in the cuts it is possible to operate a relay having 8 or more front and back contacts with only a fraction of a watt of energy from the track circuit and at a distance of 500 ft. to 1,000 ft. away, using a No. 12 wire or smaller. This relay can also be used for the direct operation of a shutter signal as in the Hudson tunnels, on a disk type of signal, without the intervention of a line relay.

Having briefly discussed the track relay, which in any system of automatic signaling is the device upon which all others must depend, I will refer you to the pages of the Signal Dictionary for a description of the various other devices which have been used to make up complete a.c. signal systems.

WHEEL FOUNDRY AND FOUNDRY METHODS; NORFOLK & WESTERN.

BY GEORGE L. FOWLER,
Associate Editor of the *Railroad Age Gazette.*

The Norfolk & Western has been engaged for many years in making a portion of the cast-iron car wheels which it uses, and as the demands have increased the capacity of the old foundry was outgrown and a new foundry was installed about two and a half years ago.

In addition to the building and equipment, which are interesting from a mechanical and structural standpoint, the methods are noteworthy because they represent advanced practice, and are in marked contrast with that found in many other places. This paper deals in some detail with the whole subject of wheel foundry practice, as handled at these Roanoke shops.

The building is of brick, and is located at the eastern end of the shop grounds between the main line and the tracks of the Shenandoah division. It is 740 ft. long by 140 ft. wide. It houses both the wheel and the gray iron foundries. The general plan shows the arrangement very clearly. It will be seen from this that the two divisions are entirely separate and distinct from each other, and yet come together without any separating or dividing wall. At the extreme eastern end of the building are the core and pattern storage rooms with the

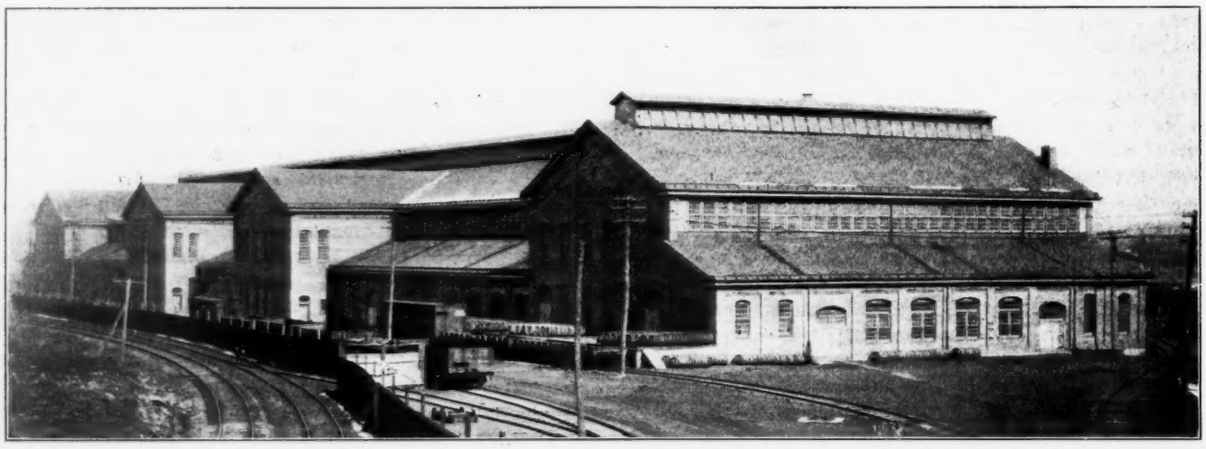
core ovens, rattlers and chipping and cleaning rooms. Then comes the main molding floor, which has a total length of about 100 ft. and is served by traveling cranes. There are three traveling cranes of 15 tons capacity each, and two wall cranes of 3 tons capacity, each type having 25-ft. booms.

In the brass foundry, at the east end and beyond the pattern storage room, the Schwartz oil furnace is used. This is especially efficient and has been found to give better results with phosphor bronze than any other type of furnace that has been tried. With it the loss of metal does not amount to more than from 1 to 1½ per cent., and it is possible to melt 800 lbs. in 45 minutes. The soft iron foundry practice does not differ essentially from that followed elsewhere, except that very close track is kept of the chemical composition of the metal used, as in the case of the wheel foundry, the details of which are to follow. Roughly speaking, it is the practice to vary the scrap used with the silicon content of the pig. That is to say, the higher the pig analyses for silicon, the more scrap it can and is made to carry, as silicon is a recognized softener. In the soft iron core room a revolving oven is used and a coke fire.

In its provision for the comfort of the men the building is provided with ample locker space, so that each man has an individual locker for his clothes, in addition to which there are bathrooms and toilets for the free use of all the employees.

The handling of the metal from the cupola to the annealing pits is done as follows: The iron is tapped into the large ladle, which is tilted by hand into the distributing ladles when the wheels are poured. After they have been knocked out they are picked up by the traveling crane and carried to one end of the annealing pits, where there are four hollow sheet-steel cones, the tops of which are somewhat above an adjacent floor. The wheels are laid upon these cones, the cores are knocked out, the spines broken off, and the sand and dirt thus dumped to one side on the floor as shown in the illustration. The wheels are then picked up by the pitting crane, put in the pit and covered over for slow cooling in the usual manner, where they remain for about a week. They are then taken out, cleaned and shipped.

Before taking up the cupola and foundry practice in detail there are a few items in connection with the service to be noted. One is the method of charging. The iron, whether pig or scrap, is loaded into small iron lorry cars that are run on the shop track to a point back of the cupola, where they are dumped into an elevator bucket, which is hoisted to the charging floor and dumped directly into the cupola. This may be considered severe on the cupola lining, and it does cut it away somewhat faster on the farther side than would be the case with hand charging, but the difference is slight. For, when the cupola is filled to the charging door, the iron, as it comes



Roanoke Wheel Foundry; Norfolk & Western.

The wheel foundry proper is equipped and operated in a manner that secures the best attainable quality of output. Its floors are of the old circular type, served by gib cranes and capable of taking 17 wheels in the circle without stacking. The crane is of a simple post design, having an 11-ft. boom, with the hoist worked by a two-cylinder reciprocating air engine, supplied with air from the shop system. The boom is a lattice construction with two 5-in. channels for the sides, and is held by two guys of 1⅛-in. round steel with turnbuckle adjustment. At the western end of the building are located the annealing pits and cleaning floors. There are 104 pits, arranged in a rectangle of 8 and 13 rows, each pit capable of holding 24 wheels, the construction of which is shown by the sectional engraving. These pits are spaced 4 ft. 8 in. on centers and have a depth of 15 ft. 6 in. to the bottom of the sand bed, which is about 4 in. thick. They are lined with firebrick and rest upon a concrete foundation and are enclosed in a concrete wall, which, with the foundation, extends 9 ft. below the floor line to a bottom of coarse broken stone. The spaces between the pits are filled with burnt sand except between the two outer rows, where clay is used. They are served by traveling pitting cranes equipped with the usual pitting tongs, of which there are four, with a capacity of 1,000 lbs. each. There is a No. 10 Whitney cupola lined to 84 in. for the wheel foundry, and two No. 8's for the soft iron foundry.

down, strikes about on the center of the previous charges and remains there without striking the lining or doing any injury whatever.

Another interesting point is the method of collecting and caring for the slag. Usually this is allowed to drule out on the floor, making a hot mass of dirt, befouling the iron that comes with it and cooling in a manner to make it very difficult to separate the iron the morning after the cast. This is, of course, aggravated by the dumping of the cupola. All this is avoided at Roanoke. There are a number of old ladles set on small lorry cars. Each car holds two ladles, the latter being lined with sand. These are run successively beneath the dripping slag, and allowed to fill. The next morning, when they are cool, they are dumped and it is found that the iron has all collected at the bottom, in the form of a button, and can be separated by a blow. This separation is shown by the illustration of two of these cones of slag and iron.

The Norfolk & Western has been engaged for many years in developing a system of cupola practice that could be depended upon for a uniform output. For years accurate records have been kept of what was done, and the failure of the earlier methods to produce uniform and reliable results has led to the development of the present system. Going back to 1896 in these records, it is found that at that time the cupola mixtures were based solely upon the brands of iron, it being taken for granted that each was of uniform character and

composition, entire reliance being placed upon the analyses furnished by the makers. The iron being graded by brands, certain percentages were used for the work. For example, a typical mixture for January, 1896, was:

Shelby No. 2	15 per cent.
Shelby No. 4	5 "
Salisbury No. 4	5 "
Juniper No. 5	5 "
Crozier No. 3	10 "
Wheel scrap	60 "
	100 per cent.

Toward the end of the month Eagle No. 2, Shelby No. 5 and Eagle No. 4 began to be introduced, cutting out juniper and reducing Shelby No. 2. At this time only one wheel was tested for each pouring, and the shrinkage ran very uniformly from 1¾ to 1⅞. The depth of the chill at the throat was standardized as ⅞ in. minimum and ⅜ in. minimum and at the tread as 1 in. maximum and ⅝ in. minimum. In practice the maximum at the throat varied from ¾ in. to ½ in. and from $\frac{11}{16}$ in. to $\frac{7}{16}$ in. maximum, and on the tread from ⅝ in. to ⅞ in. for maximum and from ⅝ in. to $\frac{13}{16}$ in. for minimum. The blows to crack ran from 4 to 40 and to break from 16 to 56.

It was in the latter part of January, 1898, that the thermal test was introduced, and with it the scrap was again raised to 70 per cent.

During the next two years the tests of wheels, the amount of scrap used and the depths of chill were kept about the same, but there was a marked tendency to recur to the older practice of increasing the number of brands of iron, as though there were an uncertainty as to their composition. The result was that in January, 1901, four brands of iron and 70 per cent. of scrap was used. With this mixture of materials, the chill was from ⅝ in. to ¾ in. in the throat and from ¾ in. to ⅞ in. in the tread.

The first recorded use of steel rails was on April 10, 1901, when 5 per cent. was used in the mixture, which then stood:

Rock Run No. 4	5 per cent.
Shelby No. 3	5 "
Shelby No. 2	5 "
Foundry No. 3	10 "
Steel rails	5 "
Wheel scrap	70 "
	100 per cent.

This proportion of steel rails was soon reduced to 2½ per cent. and remained at that figure until July 9, when it was raised to 3¾ per cent.

Interior Roanoke Wheel Foundry; Norfolk & Western.

The mixtures were varied during the year, with a general tendency to reduce the number of irons used, until in January, 1897, they were reduced to three brands and scrap. It then stood:

Rock Run No. 2	15 per cent.
Rock Run No. 4	15 "
Crozier No. 3	5 "
Scrap wheels.	65 "
	100 per cent.

The scrap had been raised to 65 per cent. the latter part of March, 1896, and was again raised to 70 per cent. the latter part of April, where it remained until the latter part of October, when it was dropped to 65 per cent. again. The use of Shelby iron was abandoned in July and Rock Run No. 2 put in its place. The January, 1897, wheels showed an almost uniform shrinkage of 1¾, though there were a few cases of 1⅝ and 1⅞. The throat chill ran from ⅜ in. to ⅝ in., and that on the tread from ⅝ in. to ⅞ in. The blows to crack each covered the wide range of from 7 to 39, while those to break ran from 13 to 48. The scrap was varied slightly during the year and stood at 67½ per cent. in January, 1898.

Whether it was due to the presence of the steel rail metal or not cannot be stated, but the fact is that immediately after its introduction the average resistance to cracking rose from 28.4 to 33 blows, while to fracture the average remained about the same at 43.5, but with greater variations. For example, prior to the use of 5 per cent. of steel, the breaking was done with from 23 to 85 blows, whereas afterward it became from 17 to 108. With the reduction of the steel rail content to 2½ per cent. there was a greater uniformity in the breaking blows, the number for May ranging from 19 to 75, though there was but one of the lower number, from which the jump was to 31.

On June 12, 1901, there is the first record of the use of ferro-silicon, of which 7½ per cent. was put in at first, which was immediately changed to 5 per cent. With this there was still a wide range of blows required to break, it being from 12 to 90, the chill remaining practically constant at from ½ to ⅝ in.

In July the ferro-silicon was cut to 1¼ per cent. and in

August it was abandoned. The July mixture was:

Rome No. 4	10 per cent.
Rock Run No. 4	5 "
Foundry No. 3	5 "
Steel rails	3¾ "
Ferro-silicon	1¼ "
Shelby No. 2	5 "
Rock Run No. 2	5 "
Old wheels	65 "
	100 per cent.

It may be added that shortly after the introduction of ferro-silicon the percentage of scrap wheels was reduced to 65.

In the latter part of September, 1902, the wheel scrap was reduced to 37½ per cent. for one day, but was immediately raised again to 50 per cent. The mixture for January, 1903, was:

Rome No. 2	5 per cent.
Rock Run No. 2	7½ "
Salsbury No. 4	2½ "
Shelby No. 4	12½ "
Shelby No. 2	10 "
Steel rails	5 "
Foundry No. 3	7½ "
Scrap wheels	50 "
	100 per cent.

Shortly after this scrap wheels were raised to 52½ per cent. and steel rails dropped to 2½ per cent., and this was held with insignificant pig variations until January, 1903. In the latter part of this month the wheel scrap was brought back to 60 per cent., with 2½ per cent. of steel rails, the chills still holding from ½ to ⅝ in.

In May, 1903, the wheel scrap was raised to 62½ per cent., but was dropped back to 60 per cent. in July. Meanwhile the steel rails were kept constant at 2½ per cent. This was continued with slight variations until September, when steel and malleable scrap were introduced, and this was developed, so that in October, 1903, the mixture stood:

Shelby No. 2	4 per cent.
Rome No. 2	7 "
Rock Run No. 2	4 "
Rock Run No. 4	2 "
Salsbury No. 4	2.5 "
Foundry No. 3	10 "
Steel rails	4 "
Steel borings	1 "
Malleable scrap	4 "
Soft steel	1 "
Manganese	0.5 "
Old wheels	60 "
	100 per cent.

Surely a complicated formula! Manganese was soon cut to ¼ per cent.

During 1904 the number of blows required to crack and break dropped lower and lower until in August they were, to crack, from 4 to 10 with an average of 8.4 and to break, from 11 to 35 with an average of 23.4.

The composition was kept constant for months at a time, and during this period there were many reports of rough tread, sand drop, bad hubs, etc.

During 1905 the wheel scrap was crowded down to 45 per cent. and steel rails raised to 5¼ per cent. It had become evident by this time that makers' analyses could not be relied upon to produce uniform and satisfactory results, so that attention was turned toward the utilization of the railway chemist for the purpose of obtaining reliable information as to the quality of the pig that was used. The value of this is shown by the variations that are to be found in different carloads of the same brand, and this has led to the development of the present method of foundry practice.

The wheel making, at the present time, is conducted upon a strictly chemical basis. Each car load of iron as it is received is sampled and analyzed and a copy of the analyses sent to the foreman of the foundry and the mechanical engineer. The former enters it in a note book with the car number in which it was received and has it piled separately so that it is readily accessible and cannot become mixed with any of the other irons. These analyses are made for combined carbon, silicon, sulphur and manganese and are color analyses so that they can be made rapidly and at small expense. The graphitic carbon in the iron is disregarded because it can have no influence on the product, since the iron is melted in a coke furnace and coming in contact with the bed is influenced accordingly, which would not be the case at all if the melting were to be done in an air furnace where the metal and the fuel were not brought together.

Further, in making the mixtures and drawing up the schedule for the charges, the foreman is governed solely by the silicon content, though keeping track of the combined carbon, because it is known that this will raise about 10 points in going through the furnace while the silicon will drop by the same amount. An attempt is, therefore, made to hold the product within certain limits, and which may be said to range as follows:

Combined carbon	.70 to .78 per cent.
Manganese	.40 " .50 "
Silicon	.53 " .55 "
Sulphur	.078" .088 "

An analysis of a test wheel from a recent heat is as follows:

Combined carbon	.75 per cent.
Manganese	.40 "
Silicon	.53 "
Sulphur	.085 "

In making up the charges to accomplish these results the work is done on the basis of the chemical analysis of each individual carload, and not by using a certain percentage of given brands, because the latter vary so widely in individual composition that they are utterly unreliable for accurate work. For example, the following are two analyses of a No. 3 foundry iron from the same furnace and supposedly of the same composition:

	Per cent.	
Manganese	.71	1.06
Silicon	1.60	2.48
Sulphur	.047	.037
Combined carbon	.49	.41

another, a coke iron is

Manganese	1.10	.63
Silicon	1.20	1.06
Sulphur	.038	.036
Combined carbon	.78	.76

With such variations as these it is evident that the brand is of but slight significance as to what is going into the furnace, and that each carload must be handled and worked separately.

The method and its results may be illustrated by the comparison of the charges of two consecutive days, where the same brands were used, but in different quantities, because of the difference in the silicon content, and yet the same results were obtained. On the first day the work done was as follows:

Brand.	Charges First 5.	Charges Later.	Silicon.	Combined carbon.
Foundry	400 lbs.	400 lbs.	1.47	69
Nellie	500 "	600 "	1.25	.59
Pioneer	400 "	300 "	.43	.70
Antrim	400 "	400 "	.41	.74
Pine Lake	500 "	500 "	.45	.71
Steel	300 "	300 "	.009	.48
Malleable iron	300 "	300 "	.46	.18
Old wheels	2700 "	2700 "	.55	.75

In this the content of the old wheels is assumed as it would, of course, be impracticable to make an analysis.

If now we multiply the silicon content of each brand by the weight used in the charge, add the results together and divide by the total weight of the charge, we will have the average silicon content of that charge and the same holds true of the carbon. If this is done with the above we have, for the first five charges, silicon .618 and combined carbon .659; and, for the later charges, silicon .633 and combined carbon .657. From this it will be seen that the silicon is lower in the early charges than in the latter, and in both cases is far higher than that desired in the finished product. In the first place, it has developed in practice that the silicon will drop about 10 points on remelting and that the combined carbon will rise by the same amount. If this should hold with the melt under consideration the result would be a wheel having about .52 silicon and .75 carbon. The reason for so proportioning the first five charges that the average silicon is lower is, because with the bed of fresh coke beneath, the charge is raised and the melting

point is higher, and the reduction of silicon in the first metal that comes down is not quite as much as in that which follows later.

In addition to this proportioning of the charge for silicon, and combined carbon, about 8 lbs. of ferro manganese is added to each charge. The object of this is to get the manganese content of the wheel as nearly .40 per cent. as possible.

To carry this illustration still farther the charges for the day following the one quoted above are given. They are:

Brand.	Charges First 5.	Charges Later.	Silicon.	Combined carbon.
Foundry	400 lbs.	400 lbs.	1.30	.67
Nellie	400 "	500 "	1.25	.59
Pioneer	500 "	500 "	.43	.70
Antrim	500 "	500 "	.59	.68
Pine Lake	400 "	500 "	.68	.72
Steel	300 "	300 "	.009	.48
Malleable iron	300 "	300 "	.46	.18
Old wheels	2700 "	2700 "	.55	.75

Calculating these charges in the same manner as before we have, for the first 5 charges, silicon .623 and combined carbon .655. For the later charges we have, silicon .645 and combined carbon .749.

In these two heats we have identically the same brands of iron throughout, and yet when taken from different carload lots, the composition is so different as to necessitate an entirely different arrangement of quantities. This will be readily appreciated from an examination of the following analyses:

	Manganese.	Silicon.	Sulphur.	Combined carbon.
Foundry	.65	1.47	.032	.69
Foundry	.65	1.30	.029	.67
Nellie	.43	1.25	.034	.59
Pioneer	.28	.43	.021	.70
Antrim	.32	.41	.029	.74
Antrim	.33	.59	.019	.68
Pine Lake	.47	.45	.014	.71
Pine Lake	.50	.68	.017	.72

Hence, out of the five brands of iron used, three were quite different on the two days, so different, in fact, that a uniform mixing would have produced bad results in at least one instance. The irons themselves are taken from various parts of the country and are coke and charcoal indiscriminately. In fact, the operators have about come to the conclusion that the charcoal iron possesses no advantages whatever over the coke. This opinion is based not only upon the fact that the irons by being treated in the cupola with a coke fire are converted to practically coke irons, and, further, the opinion is strengthened by the excellent and satisfactory service that is being obtained by these coke irons.

The brands that are used are chosen, not because they possess any properties that other irons do not have, but for convenience and ease of obtaining them and because of their price, including freight charges. They come from all parts of the country. For example, the Champion brand is a Lake Superior charcoal iron from Manistique, Mich.; this is also true of the Antrim from Mancelona, Mich.; the Pioneer from Gladstone, Mich., and the Elk Rapids from the town of that name in Michigan. The Nellie is a Bessemer iron from Ironton, Ohio; the Shelby is a southern charcoal iron from the town of the name in Alabama; the Salisbury is the well-known charcoal iron from Salisbury, Conn. The foundry No. 3 is a Virginia coke iron and usually comes from Bristol, Tenn. The Buena Vista is a coke iron from that town in Virginia, and the Iron Gate is a coke iron high in manganese from the town of this name in Virginia.

Other brands that have been used are the Rock Run and Rome, both southern charcoal irons from those towns in Alabama and Georgia, respectively.

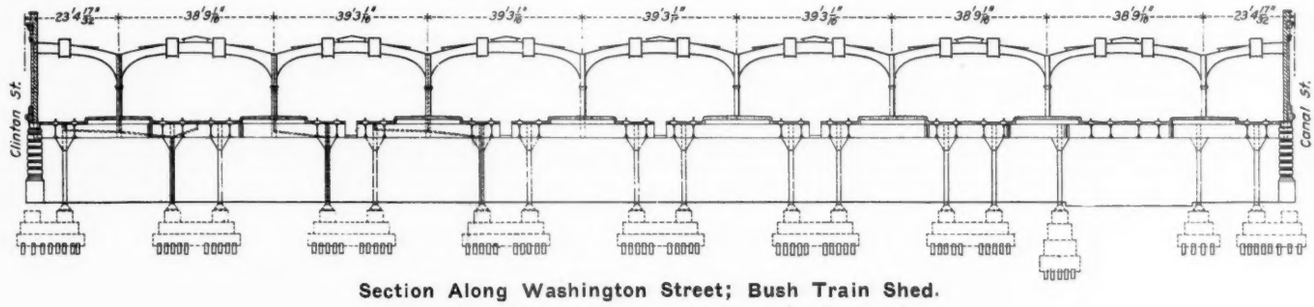
This list of irons used is given merely to show the wide range from which the stock is obtained, and how entirely independent of particular brands the making of the car wheels may be. In short, it apparently makes no difference what the iron may be, either charcoal or coke, provided only that it possesses the requisite chemical properties that are required to produce a good chill, backed by a strong gray iron.

(To be continued.)

BUSH TRAIN SHED AT CHICAGO.

The Chicago & North Western's new passenger station at Chicago, now under construction, was described in the *Railroad Age Gazette* of August 14, 1908. The Bush train shed which is being built for this structure differs only in minor details from the Bush train sheds built by the Lackawanna at Scranton (*Railroad Age Gazette*, March 19, 1909,) and at Hoboken (*Railway Age*, May 29, 1908), excepting that it is used on an elevated structure.

The Chicago station is reached by two elevated four-track approaches, and the station has 16 tracks covered by a train shed 840 ft. long and 320 ft. wide. The columns are spaced 25 ft. 6 in. apart in the direction of the platforms, while each span, over two tracks, is about 39 ft. between centers of columns. An accompanying drawing shows a cross section of the shed along the line of Washington street, which is carried under the terminal by a subway. Masonry walls form the sides of the shed on Clinton and Canal streets. The Bush sheds heretofore erected have been at ground level, the column foundations being integral with the platforms. In this case, as shown, the columns are carried through the platforms and riveted to the girders which carry the whole structure, these resting in turn on columns under the center lines of the tracks. The train shed columns are built up of latticed channels, instead of the cast iron columns used in the previous sheds. The roof is drained by 5-in. pipes carried down through the shed columns and thence through the lower columns; the spaces between tracks are drained by smaller pipes.



Section Along Washington Street; Bush Train Shed.

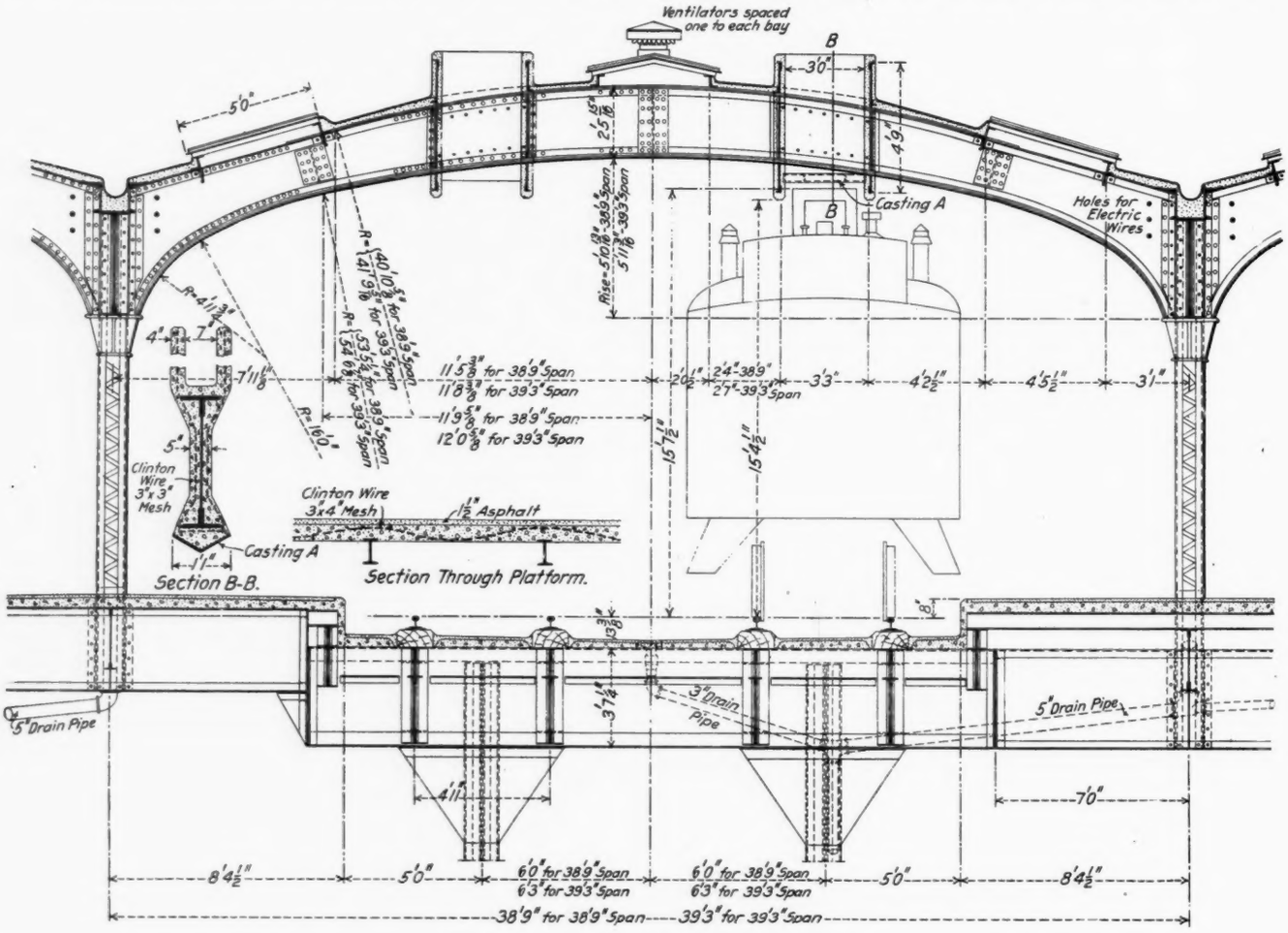
Drainage pipes shown for three spans only, to simplify drawing.

The platforms are of concrete, from 4 to 5½ in. thick, sloping in both directions from the center line for drainage. The reinforcement is of wire mesh. The concrete is covered, except at the curbs, with 1½ in. of asphalt. The track superstructure is similarly treated.

The roof of the shed is formed of reinforced concrete slabs resting on purlins, which are 6-in. bulb angles. These reinforced concrete slabs are 2½ in. thick, covered with composition roofing. They are reinforced with Trussit metal and with iron wire laced through the flanges of the purlins. The smoke ducts, or longitudinal openings over the centers of the tracks, are latticed purlins 4 ft. 9 in. deep, built up of 3-in. x 2-in. angles and 2½-in. flat lacing bars, encased in concrete

reinforced with wire mesh. The main rafters, where they pass through the smoke ducts, are encased in reinforced concrete, as shown in one of the accompanying drawings, the bottom of the concrete being protected by an angle-shaped casting. This reinforced concrete casing is carried up above the main rafters to form a trough, as shown, making an opening through the smoke duct walls at the top of the roof line to allow water to drain from the center down to the gutter over the columns. This gutter is formed by two rolled channels and a plate, which form also the longitudinal strut between columns, the channels and plate being lined with concrete covered with composition roofing. These gutters have a slope of 3 in.

Ventilation is provided by the smoke ducts, there being small flues also through the side of the smoke duct nearest to the platform just below the roof to allow air to escape



Typical Cross Section of Train Shed.

which would otherwise be pocketed. There is in each bay also a hood ventilator through the central skylight. The width of the skylights over the platforms in the Hoboken train shed is 7 ft. 10 in. and in the Scranton shed 5 ft. The width of skylights in the Chicago shed, which have a pitch of 3½ in. to the foot, is also 5 ft., it being found that there is very much less breakage of glass with the 5-ft. widths.

These sheds are patented by Lincoln Bush, Consulting Engineer, New York.

Heretofore in the north island of New Zealand there have been two systems of railways, one chiefly south of Auckland, which is near the 37th parallel, and the other, larger one, north of Wellington, which is about latitude 41 deg. 20 min. These two systems were united last November by the completion of about 150 miles of road, and trains now run through between Auckland and Wellington, 426 miles.

THE TRAIN DESPATCHER'S STATUS.*

BY J. F. MACKIE.

For many years after the discovery of the train despatcher, the chief despatcher was unknown. In those primitive days there were "hours" but no "tricks," sometimes no "hours" at all. The writer's first experience as a train despatcher was of this character. He was "the" train despatcher and on duty whenever required in that capacity, with many other duties added. An extra train was a rarity. The time-table amply provided for all traffic. When a single train on a schedule was insufficient, additional sections were run. On the Erie, in those days, these additional trains were known as extras.

At first, the one train despatcher sufficed. Few trains or none were run at night. The train order signal was a red lantern displayed on the platform and (sometimes) swung by the operator on the approach of a train. Also usually, one man sufficed to man a station. It was the writer's fate, for two years, to be that man at a station unfortunate enough to boast a water tank, supplied by gravity from a neighboring hillside spring, which furnished a superabundant supply, fed from slate rock strata, and pre-eminent among tanks for the purity of its water; therefore, greatly desired by all trainmen, for which reason all trains made a point of stopping there. It was, accordingly, a station pointed out by Nature herself as the place of all places on that division for the issue of train orders, and was so utilized by the night train despatcher, with the result that the one man who represented the non-dividend paying company there, after a painful and sufficient experience of being called up at the midnight hour or later, from a warm boarding house bed into a below zero

*From a paper read before the annual convention of the Train Despatchers' Association at Columbus, June 17.

run of several hundred yards to the station (pronounced a la Francais, for this was in Quebec) to obtain orders, with supplementary information to the effect that another train would be along in an hour or two or three, took up his cot and camped permanently in the office. But this is an aside.

As traffic increased, two despatchers became necessary, and for many years but two were employed, who were known as day and night despatchers. Each signed his orders with his own initials. There was no difference in their rank, except that each ranked next to the superintendent. The day despatcher was merely the senior. The despatcher was usually a conductor or engineman of proved experience and knowledge of rules to whom "Morse" was a stranger, but to whom a despatchership was always a promotion. Accordingly, a day and a night telegraph operator were assigned to the despatcher's office and it came to pass with time that the operator was discovered to have sufficient knowledge and ability to fill the position alone. Why, then, employ two men? The telegraph service thereafter became a school for train despatchers, and in a few years telegraphers filled every train despatcher's chair to the exclusion of all others.

Then as traffic continued to increase, came the era of three despatchers to one office, and the "trick" was evolved. Managers began to understand that twelve hours of such strenuous mental and nervous strain as despatchers were called upon to endure, impaired the quality of their service and undermined their strength. As yet the double order was unborn. All orders were single orders except annulments to all concerned. Despatchers of to-day, to whom the double order and the standard code have seemed a part of the natural order of things, can scarcely imagine the old conditions or their terrific strain on the nervous system, especially that of the men endowed with imagination, an alert conscience and a keen sense of his responsibilities. And these qualifications did preeminently possess the early train despatcher.

For many years each despatcher, during his hours of duty, was not only charged with the duty of actual train despatching, but was expected to balance locomotive power, attend to car distribution and discipline the operators, each despatcher being responsible only to the superintendent. But this arrangement did not always work well. When the daily car reports came in about 4 or 5 p.m. the burden was unduly heavy upon the second trick man, and by degrees it became the rule that the first trick man, as the senior in despatching service, was considered to be chief, sometimes working a full eight-hour, sometimes a four or six-hour trick, and afterwards looking after car and power distribution, examining operators, etc., besides being invested with a certain degree of authority over the other despatchers, and receiving for this extra service a somewhat higher salary, being also distinguished from the others by the title of chief despatcher. Having first choice of hours it came about that he naturally selected those most convenient for himself, viz., the after-breakfast hours, beginning at 8 a.m. and continuing until noon, 2 or 4 p.m. as his additional work demanded and the superintendent decreed. Hence, the anomalous "first trick." It is more logically the second, but being first choice it became first in name and has so continued to this day.

In time, with the growth of traffic, these extra duties increased to such an extent that it became necessary to relieve the Chief Despatcher from actual train despatching duty and impose upon him the duty of a general supervision of train movement on the train despatching district upon which he served. Except here and there on a few lines, the trainmaster up to this period had no existence. Where he existed he was a traveling supervisor of train men, but without authority over the chief despatcher or the train despatching service. The Chief Despatcher, situated at the center of things, conversant with all details, with full knowledge of traffic needs, in touch at all times with the car service and the motive power departments, could more intelligently and more efficiently administer such affairs under the direct control of the superintendent than could one whose duties called him out on the road for the greater part of the time, and who, as an intermediary between the superintendent and chief despatcher, tended to obstruct rather than to facilitate efficient administration.

Yet, as there is a reason for all things, there have been reasons for the advancement of the train master over the chief despatcher, which has been so marked during the past 15 or 20 years, and has, in a measure, relegated the chief despatcher to a diminished authority and influence as an official. Chief of these reasons has been the desire to centralize authority. The superintendent can deal more easily with one subordinate than with two or three co-equal in rank. Yet this has the disadvantage of removing him one step farther from an important subordinate, whose necessary deference to the intermediary checks desirable—nay, necessary—freedom of intercourse with the central authority of the division, a condition inevitably productive of friction, with a superior jealous of his prerogatives and swift to assert authority. This state of things is common, though it may not appear on the surface or come to the knowledge of the superior until an explosion occurs. More than one competent chief despatcher has quietly resigned, like a man, rather than disturb the apparent harmony of the division staff, since protest could easily be made to appear insubordination and his future be fatally imperiled.

When the superintendent is absent or disabled by illness there should be an officer of recognized authority in charge of affairs during such absence or illness, and the train master is conveniently at hand for such emergencies. Nevertheless, the chief despatcher is also at hand, and, were he co-equal in rank with the train master, could continue to attend to them as efficiently as before, without infringing upon the authority delegated temporarily to the train master, or to his continuing duty of supervising train service.

But it is the functional duty of the chief despatcher to supervise train operation, and to submerge the dignity of this function in that of the train master is a mistake of organization which tends to disorganization. True, it does not always produce it, but the tendency is unfortunately there, potent for disharmony and the lowering of healthful self-esteem in the submerged.

Gradation in rank is a necessity of organization and loyal obedience to lawfully constituted authority is essential to efficiency of administration. But degradation of rank operates against it. The train despatcher came before the train master; the duty he performed in the beginning of things continues to be his duty and will so continue, in all essential respects, while American railroading endures. But, by almost imperceptible degrees, the official dignity attaching to it has been reduced, sunk in the increased dignity and importance of the trainmaster.

Reasonable criticism of established organization and outspoken belief that it may be improved are no-wise inconsistent with perfect loyalty. They may, indeed, be consistent with the highest loyalty when aiming to remove tendencies to friction within the organization. A rearrangement of the relations which in many cases now exist between the trainmaster and chief despatcher and the superior of both, the superintendent, which would definitely and authoritatively place control of train operations in the hands of the division officer who actually performs the duties involved in such control would tend to better service and in no wise detract from similar credit or discredit due to the trainmaster for efficiency or otherwise in the performance of the duties which he performs. Why should not the names of the train despatchers be shown on time tables to inform all concerned that these are the officers duly authorized to issue train orders over the signature of the chief of their important department—or even their own, as was done before there were

chief despatchers? What train despatcher can fail to remember the feeling of pride, of added dignity, of determination to excel in the performance of duty that came to him when first entrusted with the responsibilities of a despatchership. * * * May the train despatcher and his chief ever remain faithful to their trust, true to their responsibilities and loyal to the service, and find in such loyalty the truest and highest loyalty to themselves and to the great social organization of which they, as citizens of a great, free, democratic country, are no mean part.

THE EFFECT OF THE PHYSICAL CHARACTERISTICS OF A RAILWAY UPON THE OPERATION OF TRAINS.*

PREFACE.

The paper herewith presented by its authors is intended to give, in a convenient form for use, formulas and methods for tonnage rating and for comparing projected lines.

JOHN D. ISAACS.
E. E. ADAMS.

INTRODUCTION.

The purpose of the following work is to obtain mathematical expressions by which we may compute the behavior of any train on any grade, and the following formulas are necessary:

(1) Train resistance at any velocity.

(2) Mean effective pressure in terms of boiler pressure at any velocity.

(3) Tonnage rating of any engine on any grade at any velocity.

(4) Velocity, distance and time formulas, by which we may compute:

(a) Acceleration of any train with any initial speed, with decreasing velocity, on any grade, at any time.

(b) Acceleration of any train with any initial speed, with increasing velocity, on any grade, at any time.

The use of the above mathematical expressions when obtained will be:

(1) To rate any engine at any desired speed on a given grade.

(2) To predict the velocity, distance passed over, and time in transit of any engine hauling any load, starting with any initial velocity.

(a) Given the profile, to predict timetable for any section of railway.

(b) To make velocity diagram for any section of railway.

(c) To show what grades may be handled as momentum (or velocity) grades; also minimum velocity of approach to such grades.

In general the utility of the above work is:

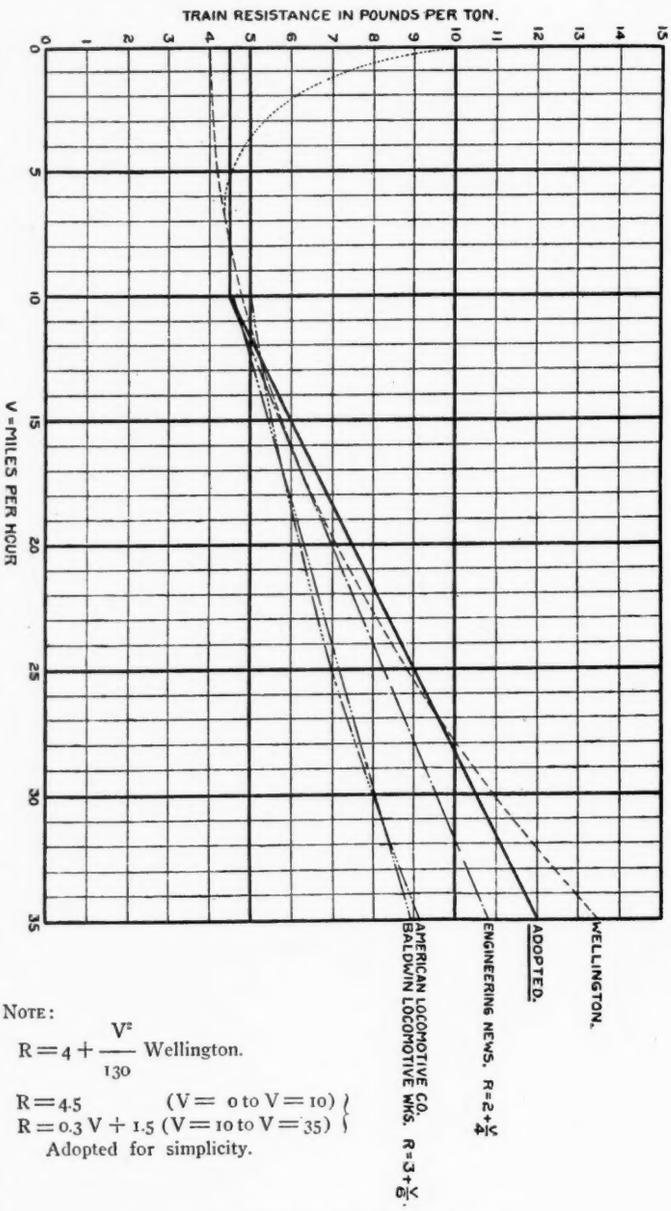
(1) To rate trains over an existing line.

(2) For the economic study of proposed lines, taking into account the effect of the physical characteristics as to their influence on operation and cost of operation of trains.

LOCOMOTIVE TONNAGE RATING FORMULAS.

Symbols.

A = A constant substituted for convenience.
B = Boiler pressure in pounds.
$C = \frac{L}{D}$ for convenience.
D = Diameter of drivers in inches.
d = Diameter of cylinders in inches.
F = Accelerating force in pounds.
G = Per cent. of grade.
K = A constant substituted for convenience.
L = Stroke of engine in inches.
p = Mean effective pressure in pounds.
r = Train resistance in pounds per pound.
S = Distance traveled by train in feet.
s = Piston speed in feet per minute.
T = Traction in pounds.
t = Time in minutes.
V = Train speed in miles per hour.
v = Train speed in feet per second.



NOTE:

$R = 4 + \frac{V^2}{130}$ Wellington.

$R = 4.5$ ($V = 0$ to $V = 10$)
$R = 0.3\,V + 1.5$ ($V = 10$ to $V = 35$)
Adopted for simplicity.

Fig. 1—Train Resistance Diagram.

W = Weight of train, including locomotive and tender (in pounds).
w = Weight of locomotive and tender.
Log. = Ordinary logarithm, base 10, unless otherwise stated.

FORMULAS.

(1) $r = \left(\frac{0.3\,V + 1.5}{2{,}000}\right)$ for $V = 10$ to $V = 35$:

$r = \left(\frac{4.5}{2{,}000}\right)$ for $V = 0$ to $V = 10$

(2) $p = B\left(\frac{95}{100} - \frac{7s}{11{,}000}\right)$

(3) $\frac{G}{100}$ = Grade resistance

*From Bulletin No. 112 of the American Railway Engineering and Maintenance of Way Association, June, 1909.

(4) $T = d^2 CB\left(\frac{10{,}450 - 392\,VC}{11\,000}\right)$

(5) $W = \frac{T}{r + \frac{G}{100}} = \frac{d^2 CB\,(10{,}450 - 392\,VC)}{24.75 + 110\,G}$ for V = 0 to V = 10

$= \frac{d^2 CB\,(10{,}450 - 392\,VC)}{1.65\,V + 8.25 + 110\,G}$ for V = 10 to V = 35

(6) $S = \frac{734.8\,W}{K}\left\{V_0 - V_1 + 2.3\,\frac{A}{K}\,\log.\left|\frac{\frac{A}{K} - V_0}{\frac{A}{K} - V_1}\right|\right\}$

(7) $t = \frac{19.2\,W}{K}\left\{\log\left|\frac{\frac{A}{K} - V_0}{\frac{A}{K} - V_1}\right|\right\}$

(8) $\left.\begin{array}{l} A = 10{,}450\,d^2 CB - 110\,WG - 24.75\,W \\ K = 392\,C^2 d^2 B \end{array}\right\}$ V = 0 to V = 10

$\left.\begin{array}{l} A = 10{,}450\,d^2 CB - 110\,WG - 8.25\,W \\ K = 392\,C^2 d^2 B + 1.65\,W \end{array}\right\}$ V = 10 to V = 35

Value of "W" in (6) or (7) is arbitrary.

Values of "A" and "K" in (8) are for both (6) and (7).

DERIVATION OF FORMULAS.

Train Resistance.

$r = \frac{4.5}{2{,}000}$ for V = 0 to V = 10 and $r = \frac{0.3V + 1.5}{2{,}000}$ for V = 10 to V = 35

Mean Effective Pressure.

$p = B\left(\frac{95}{100} - \frac{7s}{11{,}000}\right) = B\left(\frac{10{,}450 - 392\,VC}{11{,}000}\right)$; since $s = 56\,VC$

Traction.

$T = \frac{d^2\,p\,L}{D} = d^2 CB\left(\frac{10{,}450 - 392\,VC}{11{,}000}\right)$ in pounds.

$W = \frac{T}{r + \frac{G}{100}} = \frac{d^2 CB\,(10{,}450 - 392\,VC)}{24.75 + 110\,G}$ for V = 0 to V = 10

$= \frac{d^2 CB\,(10{,}450 - 392\,VC)}{1.65\,V + 8.25 + 110\,G}$ for V = 10 to V = 35

Acceleration.

Acceleration force × distance = W (h − h¹) when h = $\frac{v^2}{2g}$ = velocity head, and v = 1.466 V; d h = (h − h¹).

$F\,d\,S = W dh$; $h = \frac{2.09\,V^2}{2\,g}$; $\frac{d\,h}{d\,V} = \frac{2.09\,V}{g}$; $d\,h = \frac{2.09\,V\,d\,V}{g}$

$d\,S = \frac{2.09\,W}{g}\left(\frac{V\,d\,V}{F}\right)$; d S = differential of distance.

$F = T - \left(\frac{W\,G}{100} + Wr\right) =$

$\left.\begin{array}{l} \left[\frac{d^2\,CB\,(10{,}450 - 392\,VC)}{11{,}000} - \frac{WG}{100} - \frac{W\,(0.3\,V + 1.5)}{2{,}000}\right] \\ = \frac{1}{11{,}000}\left[\begin{array}{l} 10{,}450\,d^2 CB - 110\,WG - 8.25\,W \\ -V\,(392\,C^2 d^2 B + 1.65\,W) \end{array}\right] \end{array}\right\}$ For V = 10 to V = 35.*

Let $\left\{\begin{array}{l} A = (10{,}450\,d^2\,CB - 110\,WG - 8.25\,W) \\ K = (392\,C^2\,d^2\,B + 1.65\,W) \end{array}\right\}$ for convenience

$F = \frac{1}{11{,}000}[A - KV]$

Distance.

$d\,S = \frac{11\,000\,W\,2.09}{g}\left(\frac{V\,d\,V}{A - KV}\right)$

$S = \int_{V_0}^{V_1} \frac{11{,}000\,W\,2.09}{g}\left(\frac{V\,d\,V}{A - KV}\right)$

$= 734.8\,W \Big|_{V_0}^{V_1}\left[\frac{1}{K^2}[A - KV - A\,\log.^e (A - KV)]\right]$

$= \frac{734.8\,W}{K} \Big|_{V_0}^{V_1}\left[\frac{A}{K} - V - 2.3\,\frac{A}{K}\log_{10}\left(\frac{A}{K} - V\right) - 2.3\frac{A}{K}\log_{10} K\right]$

$= \frac{-734.8\,W}{K}\left\{V_0 - V_1 + 2.3\,\frac{A}{K}\log_{10}\left|\frac{\frac{A}{K} - V_0}{\frac{A}{K} - V_1}\right|\right\}$

*Derived in similar manner for V = 0 to V = 10.

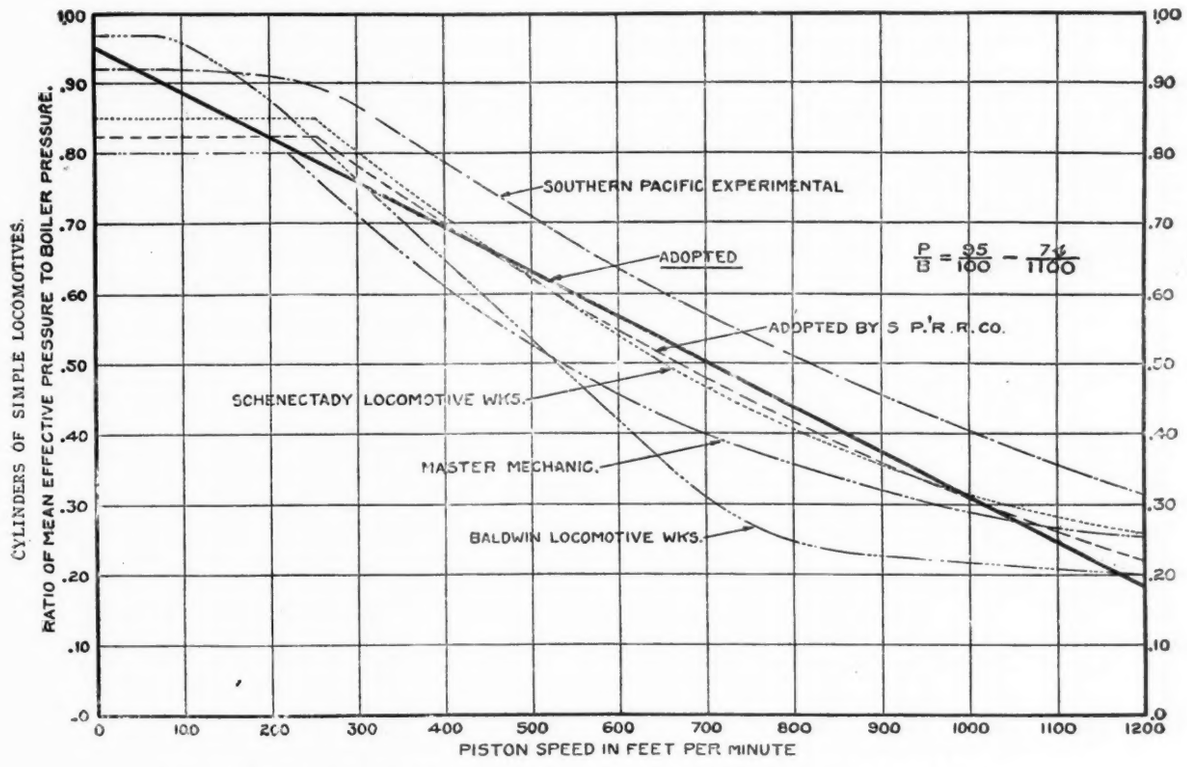


Fig. 2—Ratio of Mean Effective Pressure to Boiler Pressure at Various Speeds.

$$\text{Where} \begin{cases} A=10{,}450\,d^2CB-110\,WG-24.75\,W \\ K=392\,C^2\,d^2\,B \end{cases} \Big\} V=0 \text{ to } V=10$$

$$\begin{cases} A=10{,}450\,d^2CB-110\,WG-8.25\,W \\ K=392\,C^2\,d^2\,B+1.65\,W \end{cases} \Big\} V=10 \text{ to } V=35$$

Time.

$$\frac{dS}{dt}=v=88\,V$$

$$dt=\frac{dS}{88\,V}=\frac{734.8\,W\left[\frac{V\,dV}{A-KV}\right]}{88\,V}$$

$$=\frac{734.8\,W}{88}\left[\frac{dV}{A-KV}\right]$$

$$t=\frac{734.8\,W}{88}\int_{V_0}^{V_1}\frac{dV}{A-KV}=\frac{-734.8\,W}{88}\left[\frac{1}{K}\log_e(A-KV)\right]_{V_0}^{V_1}$$

$$=\frac{-19.2W}{K}\left[\log_{10}\left(\frac{A}{K}-V\right)-\log.K\right]_{V_0}^{V_1}$$

$$=\frac{-19.2\,W}{K}\left|\log_{10}\left[\frac{\frac{A}{K}-V_0}{\frac{A}{K}-V_1}\right]\right.$$

Where "K" and "A" are the same as in the distance (S) formulas.

DISCUSSION OF FORMULAS AND DIAGRAMS.

The foregoing formulas, when the constants are known, may be plotted as diagrams for a general study of any road, or may be solved arithmetically for special information desired.

TRAIN RESISTANCE (DIAGRAM 1).

It will be noticed that the straight line adopted showing the relation between train resistance and velocity corresponds very closely to the Wellington curve between the limits of 0 and 35 miles per hour. There is such a wide discrepancy between the various authorities as to the actual value of train resistance that it would seem that our adopted line is as much justified as any curve would be. At the same time the straight line formula simplifies the mathematical work. This train resistance is supposed to be for medium loaded cars—in other words, an average freight train. It is the resistance due to velocity alone and takes no account of the internal friction of the engine.

RATIO OF MEAN EFFECTIVE PRESSURE TO BOILER PRESSURE (DIAGRAM 2).

In like manner the ratio of mean effective pressure to boiler pressure at various speeds is taken as a straight line to simplify the mathematics. It will be noticed from the diagram that this line corresponds very closely with the curve adopted by the Southern Pacific Company, which in turn was drawn as an average of the curves given by both experimental work and other authorities. Here again we notice such a considerable difference in data that our straight line assumed appears to be as nearly an average as any curve.

The errors, if any, introduced by the adoption of the two above straight line formulas tend to offset each other.

The particular arithmetical constants in the formulas for train resistance and ratio of mean effective pressure to boiler pressure need not necessarily be used. The principal purpose of this article is to indicate a method which may be followed. The actual constants to be used may vary under different conditions.

(To be continued.)

THIRTY-YEARS' DEVELOPMENT, METER-GAGE LOCOMOTIVES, INDIAN STATE RAILWAYS.

The accompanying photograph strikingly illustrates thirty years' progress in metre-gage locomotives for India. Both engines were built by Messrs. Nasmyth, Wilson & Company (Limited), of the Bridgwater Foundry, Patricroft, near Manchester. On the right hand side is shown a 4—6—0 passenger locomotive built four years ago for service on the Eastern Bengal State Railway, with the following leading dimensions:

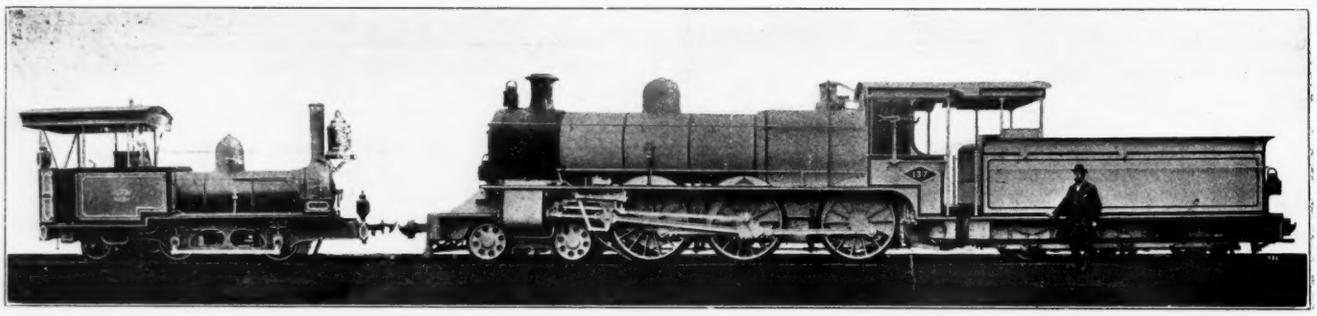
Working pressure	180 lbs.
Cylinders, diameter	15½ in.
Cylinders, stroke	22 "
Valve gear	Walschaerts'
Wheels, diameter, truck	2 ft. 4½ in.
" " driving	4 " 9 "
" " tender	2 " 4½ "
Tractive force at 75 per cent. of boiler press.	12,520 lbs.
Tubes, number	177
Tubes, diameter	1¾ in.
Heating surface, firebox	108 sq. ft.
" " tubes	954 "
" " total	1,052 "
Grate area	16 "
Fuel capacity	170 cu. ft.
Water capacity	2,000 gals.
Wheel base, engine, total	21 ft. 1½ in.
" " rigid	12 ft.
" " tender	11 "
" " engine and tender	42 ft. 1¾ in.
Length, engine and tender over buffers	52 " 8⅛ "
Extreme height	11 ft.
Extreme width	8 ft. 6 in.

	In working order.	Empty.
Weight: Engine	74,704 lbs.	66,976 lbs.
Tender	49,280 "	21,280 "
Total	123,984 "	88,256 "

Adhesive weight in working order	58,240 lbs.
Ratio of adhesive weight to tractive force	4.65 : 1

To the left is shown the original tank engine supplied by the same firm in 1875 for use on the Northwestern Provinces Railway, which is still working the passenger services on the Rohilkhund & Kumaon branch, and has the following leading dimensions:

Working pressure	140 lbs.
Cylinders, diameter	9 in.
Cylinders, stroke	14 "
Valve gear	Stephenson's
Wheels, diameter, coupled	2 ft. 6 in.
Wheels, diameter, trailing	2 " ⅜ in.
Tractive force at 75 per cent. of boiler pressure	3,970 lbs.
Tubes, number	70
Tubes, diameter	1½ in.
Heating surface, firebox	25.4 sq. ft.
" " tubes	247.5 "
" " total	272.9 "
Grate area	5.8 "
Fuel capacity	17 cu. ft.
Water capacity	300 gals.
Wheel base, total	11 ft.
Wheel base, rigid	11 "
Length over buffers	21 ft. 4 in.
Extreme height	9 " 3 "
Extreme width	7 " 4 "
Weight in working order	30,576 lbs.
Weight empty	24,304 "
Adhesive weight in working order	22,400 "
Ratio of adhesive weight to tractive force	5.64 : 1



Thirty Years' Development of Meter-Gage Locomotives in India.

PRIVATE CARS FOR LAND COMPANIES.

The Hicks Locomotive & Car Works will shortly turn out from its Chicago Heights, Ill., plant three private cars to be used by land companies in taking customers to inspect farms which they have for sale. One is for the Luse Land Co., Ltd., St. Paul, Minn., which at the present time is handling a large tract of land in the Tramping Lake district in Saskatchewan, Canada. The second is for the Canadian Real Estate Co., also of St. Paul, which is operating in western Canada. The third car is for sale. These cars are alike and are said to be the finest and most completely equipped cars ever built for such use.

They are 70 ft. 6 in. long over end sills, 10 ft. 4 in. wide and 14 ft. 4½ in. high over all. They have an observation room 10 ft. 8½ in. long, with a large sofa which forms an upper and a lower berth; a stateroom with a standard section and sofa, and nine standard sections, giving a sleeping capacity of 33 people exclusive of the crew. The cars are equipped with kitchen, pantry, lockers, toilet facilities and accommodations for the crew, and have a large observation platform with railings and gates. Both platforms are covered with rubber tiling. A floor plan and a photograph of one of the cars are shown herewith.

Hicks Private Car for Land Companies.

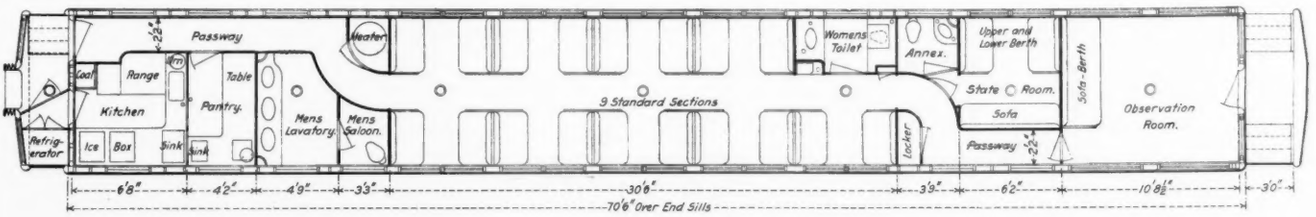
The framing of these cars is standard cantilever construction of heavy section with continuous blocking throughout. The blocking is 1¼ in. below and ⅞ in. above the belt. The sills and end posts are plated with ½-in. steel. The kitchen end of each car has a standard vestibule and the cars are equipped with an anti-telescoping device.

The exterior is finished with standard Pullman color and the interior is quarter-sawed oak, except the kitchen, which is finished in plain oak. The decoration is plain inlaid lines of holly and vermillion wood, forming panels in the observation room and around the berths. The upholstery of all seats is green plush. The window curtains are silk-faced Pantasote with Forsyth roller-tip fixtures.

One car has electric light, wired for connection with a head-end generator system, and also has bracket oil lamps for emergency use. The second car is lighted with Pintsch gas. The heating system is combined steam and hot water, and provision is made for hot and cold water at the wash-stands. The hot water coils are arranged to heat the water at the range. Each car has a water tank capacity under the car of 190 gals., and is equipped with the air pressure system.

The fittings and specialties of these cars are of the most modern type. The trucks are Hicks standard six-wheel, with M. C. B. fittings, 5 -in. x 9-in. journals and 36-in. steel-tired wheels with cast-steel centers. The wheel-base of each truck is 11 ft.

These cars compare favorably with the best modern private cars, and were designed especially for these land companies, which are the largest operators in farm lands in North America. They will run out of Chicago, St. Louis, St. Paul and Minneapolis to the Canadian northwest in the limited trains.



Plan of Hicks Private Car.

PRESERVATION OF TELEGRAPH POLES.*

BY H. P. FOLSOM.

We dig down around the pole a distance of about 14 in. down from the ground line and clean off any decayed wood from the surface of the pole (if it is an old pole). We then place a layer of Portland cement mixed with sand around the pole at the bottom of the excavation. Next place around the pole our hydrobestos jacket 1 to 2 in. therefrom, imbedding the lower edge of the same in the cement. The two edges of the jacket are lapped from 1 to 2 in. and fastened with a specially prepared cement and tacked upon a lath inside the jacket. We next fill the space between the pole and the jacket with our germicides in a dry state, mixed with sand. We then form around the top of the jacket a

*From a paper read before the Railway Telegraph Superintendents at Detroit, Mich. The author is the representative of the Universal Pole and Post Preserving Company of Circleville, Ohio.

reinforced cap or collar made of Portland cement. For reinforcing we use one or more wires around the pole, imbedded in the cement. The collar protects the chemicals and jacket from the action of the rain and snow, and if along steam railways, protects the pole against the numerous grass fires. The chemicals are slowly dissolved by the natural moisture in the pole, and they pass into the same by capillary attraction. As they cannot pass out into the surrounding ground, they go into the pole, thus destroying all fungi and wood destroying insects. We have then a continuous absorption of chemicals and a mechanical exclusion of germs. The hydrobestos jacket is a pure mineral, composed of specially prepared and purified asbestos and asphaltum. This material is subjected to a pressure of about 27,000 lbs. per sq. in. in its manufacture. There is no animal or vegetable fiber in it and it is practically indestructible in the situation used.

We have used all kinds of metals and materials, but hydrobestos seems to give the best results. In some special locations we form the jacket of cement. The reinforced Portland cement cap is an important part of the protective device. It prevents the rain and snow from entering the receptacle holding the germicides and gives a stability and attractiveness to the pole. This collar does not crack as there is practically no expansion and contraction of the pole at the ground line. There is no secret about germicides. We use hydrated lime (rock), chloride of sodium, mixed with coarse sand and one-quarter to one pound sulphate of copper (per pole) according to size and condition of the pole. While we do not approve putting poles and posts in the ground while green, yet we have treated sycamore, willow, soft maple, cotton wood, Carolina poplar and red oak posts that were cut in the spring and placed in the ground, which after three years showed not the slightest sign of decay, although some of them were cracked above the ground line. Our treatment of telephone and other poles, whether seasoned or unseasoned, has given uniformly good results.

On small jobs the men work in gangs of three. One gang can treat from 20 to 30 poles a day. The cost would be from 75 cents to a dollar a pole, including royalty. It will richly repay any company to treat poles at this cost if thereby the life of the pole can be extended 10 or 15 years or practically doubled. We have poles which were partially decayed when treated and after nine years show no increase in the decay and the protecting device is in good condition. A pole protected in this way will retain its full strength at the ground line for, say, 10 years. That fact alone is of great advantage in sleet and wind storms.

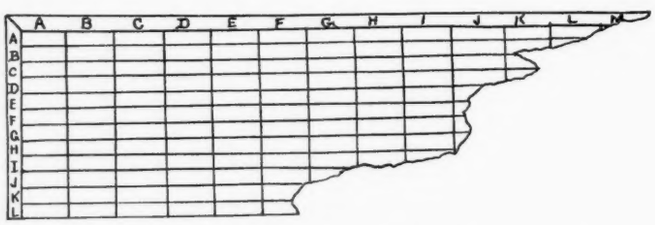
A TIME SAVER IN THE LOCAL FREIGHT OFFICE.

At the local freight office of the Canadian Pacific, in Toronto, the clerk at the telephone has constantly before him copies of the arrival notices made out for each consignee on the arrival of freight, and, these being suitably assorted alphabetically, he can usually answer a telephone inquiry from any person or firm in 20 seconds or less. The notices are classified not only under each letter of the alphabet, but also, when necessary, by subdivisions under each letter. This time saving arrangement was made necessary by the exacting demands of consignees, who are constantly calling for early and positive information regarding a large proportion of their shipments.

When waybill's arrive the clerk who makes the expense bills uses carbon sheets and makes four copies at one writing. One of these copies, the "No. 4," which is called the office record, is handed at once to the clerk in charge of the cabinet at the telephone, who assorts all of the sheets received and puts them in the proper pigeon holes. Then, on the receipt of an inquiry, for example, from the T. Eaton Company, as quickly as the clerk can turn and catch the letter "E" on the horizontal line and letter "A" on the perpendicular one, he is enabled immediately to locate the proper pigeon hole and get the necessary information. The "Number 4" being a carbon of the "Number 1," all information as to date of arrival, date of shipment, number and kind of packages, weight and charges, are right before him, so that all questions relating to the shipment can be answered intelligently. In the event of goods not being in and consignee wishing to be advised by phone when they do arrive, a "pink" slip is used; the information being inserted in it as to date shipped, kind and quantity of goods, and the consignee's phone number. This "pink" also serves the purpose of a directory for keeping track of inquiries made by transient persons, when, together with the information above referred to, the street address is also inserted. When the goods finally arrive and the No. 4's are being distributed into their proper places, if a "pink" is discovered in a pigeon hole, immediately the consignee is phoned or the street address, as the case may require, is handed to delivery clerk.

The cabinet has not stopped answering questions yet. The same consignee phones, "when will our goods be delivered?" This can be answered as quickly as any of the other questions. When the delivery clerk passes over the sheets to the cartage company the "No. 3" is retained for the accounting department, but before these are passed to that department the inquiry clerk takes them and in spare moments takes out the corresponding "No. 4" and places it in the "Z" space at the bottom. All he then has to do when he fails to find a "No. 4" in its proper place is to look in "Z" and he is then in a position to know whether any of it is passed out and on its road for delivery.

At the close of the day the "Z's" are all taken out and tied together and dated and sent to the record room. If taken



Cabinet for Holding Freight Arrival Records.

from one pigeon hole after another in regular order they will be found when tied in alphabetical order.

If a consignee has inquired several times and it seems desirable to start a tracer, the "pink," with the information obtained at the time of the first call, is still in the pigeon hole, and is available for quickly making a memorandum which can be handed to the tracing clerk, thus saving the consignee all unnecessary trouble.

In view of the fact that one is enabled with its use to tell when goods arrived, how long on hand, when passed out for delivery, street addresses, special information desired by consignees, and give information to tracing desk, we are warranted in calling this a perfect freight inquiry system.

For economy in space, it is advisable to have the cabinet made in two sections, as the width of the advice notes would necessarily make it long. These two sections when placed at right angles facilitate the work of the clerk in charge. In order to save further space, one may double up on such letters as U and V, etc. When made in two sections it will be necessary to have a perpendicular alphabet on each section. The perpendicular portions of each tier are made of wood and the horizontal ones of tin, with half circles cut out in front to make it easy to grasp bills.

The style of the cabinet will be understood from the sketch shown above, which, it will be seen, shows a double use of the alphabet, the horizontal line being the initial letter and the perpendicular one the second letter in consignee's name.

This system was devised by James Oborne, general superintendent of the Ontario division, and the cabinet is homemade.

General News Section.

The State Board of Assessors of Oklahoma has increased the assessment of railway property in that state from $174,529,192 to $182,112,464. The assessment of main line was $171,397,574; side track, $6,756,367; and of buildings, $3,949,713.

The Indiana Railroad Commission has authorized criminal proceedings in the Circuit Court at Logansport against the Pittsburgh, Cincinnati, Chicago & St. Louis for violation of the full crew law. The complaint alleges that the road ran a train to Logansport from Richmond which did not have a brakeman. The penalty is a fine from $100 to $500.

It is understood that the Atchison, Topeka & Santa Fe recently bought in Japan about 170,000 cocobolo wood ties, which are being made ready for use near Great Bend, Kan. The ties will cost $2 apiece in place and are expected to have a life of 25 to 30 years. The wood is so hard that an ordinary spike cannot be driven into it, and so screw spikes will be used.

Reports have been current in the newspapers that E. T. Jeffery is to resign as president of the Denver & Rio Grande and the Western Pacific, and is to be succeeded by F. A. Delano, who, according to the same reports, is to resign as president of the Wabash and to be succeeded by B. A. Worthington. Mr. Jeffery and Mr. Delano have stated that these reports are baseless.

In a new telegraph line which has just been built by the Chicago, St. Paul, Minneapolis & Omaha in Minnesota, the poles have been set nearer together than formerly, and every fifth pole is guyed; this with a view to providing against destruction and damage by sleet storms. There are 45 poles to the mile. Sleet storms are pretty sure to occur in Minnesota, at least once every two years.

The Pennsylvania Railroad Company has filed a petition before the Indiana Railroad Commission against the Indianapolis, Columbus & Southern Traction Company asking for the elimination of a grade crossing of the two lines four miles south of Indianapolis. This is the first petition filed before the commission for the elimination of a grade crossing between a steam and electric line under the new law.

According to press despatches, the Southern Pacific has applied to the Forestry department for permits to build power plants on lands within the government forest preserve in Sierra county, Nev., permits for building power plants along the Rubicon river having been already obtained. It is understood that this application has in view the use of these water powers to furnish power for the electric propulsion of trains over the Sierra Nevada mountains.

According to the *Houston Post*, the law recently passed in Texas requiring automatic couplers on all railway cars will force many small roads in the state to give up their charters. These small roads with poor track were built to carry logs, but many of them, it appears, accept passengers and miscellaneous freight and have thus served as common carriers; but now it is said they will have to give up this business. The law goes into effect January 1, next. As in the case of one road mentioned in these columns last week, the universal complaint is that the tracks are so uneven that vertical plane couplers cannot be used.

Samuel Rea, second vice-president of the Pennsylvania Railroad, believing, evidently, that the projects for new subways in New York are not making rapid progress, has written to Mr. Wilcox, chairman of the State Public Service Commission, calling his attention to the need of subway connections with Seventh avenue and Thirty-third street, the new station of the Pennsylvania. This station is to be opened next summer, and the desired new subways evidently are not going to be ready by that time. The latest proposals of the Interborough company include a line in Seventh avenue, and, following the publication of Mr. Rea's letter, the Bradley-Gaffney-Steers Company announced a modification of its proposal which would provide the necessary connection.

Pennsylvania Tunnel Connection to Cortlandt Street, New York.

Beginning next Monday passengers for the Pennsylvania Railroad can board the cars in New York city. An arrangement has been made with the Cortlandt street tunnel line, and there is to be no extra charge; the fare will be the same as by ferry. Baggage, however, for the present, will not be checked by the tunnel line. Following is the substance of the announcement:

"The Pennsylvania Railroad, in conjunction with the Hudson & Manhattan, has arranged that all tickets to and from New York shall, without additional charge, be valid through the new Hudson tunnels to and from the Hudson Terminal building, at Church and Cortlandt streets, New York city, within one block of Broadway and adjoining a Sixth avenue elevated station. Passengers coming to New York will have the alternative of crossing the river on the company's ferryboats to Cortlandt, Desbrosses and Twenty-third streets, or of taking an elevator in the station at Jersey City, descending to the Hudson tunnel and going by subway to the terminal in New York City. Coupons are to be attached to tickets from Philadelphia and points east, which will be collected at the entrance to elevators in the Jersey City station. Commutation tickets will be punched there. Passengers coming from points south or west of Philadelphia will, upon application, and without charge, be supplied by the conductor with a tunnel ticket before reaching Jersey City. Leaving New York, all Pennsylvania Railroad tickets are to be accepted on the concourse floor of the Hudson terminal for transportation to Jersey City. For each regular Pennsylvania train a special tunnel train will leave the Hudson terminal five minutes after the Cortlandt street ferry and ten minutes after the leaving time of the Twenty-third street ferry. Tickets to all points on the Pennsylvania will be sold at the Hudson terminal."

The reader will recall that the Cortlandt street tunnel at its western end turns and runs north to the Erie and the Lackawanna stations, and that at the Lackawanna station the earlier tunnel of the Hudson & Manhattan crosses the river to Christopher street, Manhattan, and runs northward on Sixth avenue to Twenty-third street. The north and south line on the New Jersey side is to be opened August 2, and the Erie has issued notices that beginning with that date passengers can travel to and from the Erie station by the tunnel cars; but, unlike the Pennsylvania, the Erie does not propose to absorb the tunnel fare. It will cost the passenger five cents for each trip. All that can be got out of the Hudson & Manhattan officers concerning this matter is that as yet no joint fare arrangements have been made with either the Erie or the Lackawanna.

Automatic Block Signals on U. P. and S. P.

That the Southern Pacific holds a unique position in the railway world, in the matter of automatic block signaling, is a fact well known to the readers of the *Railroad Age Gazette*. An officer of the road writes to remind us that in our note of June 18, telling of the continuous line of automatic block signals stretching across the continent, we ignored the fact that the Southern and the Union together, have on their main lines about 2,200 miles of automatic signaling in addition to that which was then noticed. Our correspondent also reminds us that of the 1,785 miles of the main line from Council Bluffs to Oakland Pier, 417 miles is double track. He says, also, that the distance between Benecia and Port Costa should not be omitted, as there is at that point the very best protection against collision, the ferryboat Solano being the staff; only in this instance the staff carries the train instead of being carried by it! The other lines referred to are: San Francisco to El Paso, via the Coast Line; distance 1,295 miles, 834 equipped with automatic block signals; El Paso to New Orleans, 1,194 miles, 481 miles automatic. This signaling is all east of San Antonio, little, if any, of the 622 miles between

San Antonio and El Paso being protected by automatic signals. From Roseville, Cal., the junction point of the Shasta Route to Portland, Ore., a distance of 664 miles, there is a length of 192 miles of continuous automatic block signals. Eastward from Portland by the Oregon Railroad & Navigation Co. and the Oregon Short Line to the Union Pacific at Granger, a distance of 945 miles, a length of 736 miles has continuous automatic signals. It is expected that during this coming fiscal year automatic block signals will be installed on approximately 1,000 miles additional.

W. L. Ross to the Milwaukee Transportation Association.

They tell a story down on the Fox River branch of the Burlington road of a man who always persisted in paying his fare in cash to the conductor. The conductor called his attention to the fact that he lost ten cents in cash every time he did this. But the man replied: "This blamed old road gave me the worst of it in settling for a cow they killed for me seven years ago. I said that they would never get another cent of my money and they never have from that day to this."

Like that man, the average legislator seems to be determined to keep the gross receipts of the railways as low as possible, even though his constituents suffer in the meantime by the inability of the road to make improvements or extensions that the growth of his section of the country may imperatively demand.

The average man, fairly well informed, will acknowledge that the greatest of all our industries is that of transportation. And yet in all the thirty or more states whose legislatures have met this winter and spring the only legislation that has had any serious consideration has been legislation that was primarily intended to decrease the receipts of the road while raising the standard of service to the public. If in any one of those legislative halls a member had risen in his place and frankly announced that he wished to introduce a bill for the relief and benefit of the railways, that man would have had his seat declared vacant instanter on the grounds of mental incapacity for legislative business.

Now what is to be the ultimate benefit of this eternal nagging of the common carriers? Down in Illinois they are making us run on a narrow embankment with a two-cent passenger rate on one side of us and a $20,000,000 waterway on the other, for the ostensible purpose of reducing or "regulating" the freight rates. The price of almost every other commodity is "regulated" only by the law of supply and demand, and the customary operation of commercial laws. The railways must live and operate their lines to make a profit. When they make their rates prohibitive, or decrease their service to the point of inconvenience to the public, their business will of itself disappear. It would seem only reasonable that the point where the public demand for low priced service and the profitableness of that service meet should be left to the carriers rather than to a "knocking" legislature, which knows nothing of the conditions, either of public demand for service or of the point where frequency or kind of service ceases to be profitable.

Gradually some of these truths are coming home to the people, and more of them are realizing that on the face of the land the railway occupies as prominent a position as the nose does on the human countenance. And they will some day wake up to the fact that it is poor policy to cut off the nose to spite the rest of the face. The railways cannot be unjustly legislated against without injuring the entire country. They are not only the right hand of every industry, but they are also the principal customers of many of the most important manufacturing and producing enterprises of the land. When you destroy the purchasing power of the American railway you set in operation a chain of retrenchment and economizing that reaches almost every individual home in the country.

Panama Canal Estimate.

The Secretary of War announces that the estimated amount of money required for work on the Panama canal during the fiscal year beginning 12 months hence—July 1, 1910—will be $45,100,000. This is about $12,000,000 greater than the amount appropriated for the current year.

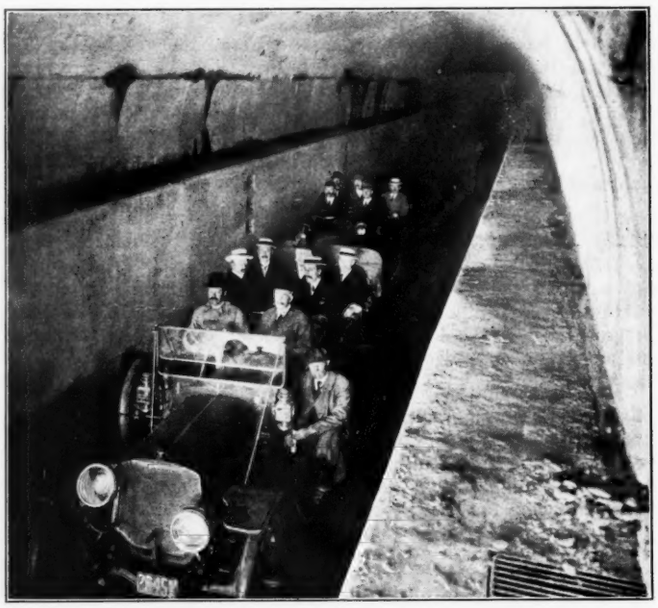
Fourth of July at Springfield.

The new shops of the St. Louis & San Francisco at Springfield, Mo., were formally opened July 5, and there was a general celebration, combined with the celebration of the national holiday. There was a flag raising and speeches by the railway officers. About 50,000 persons visited the shops during the day. The company furnished free transportation from the city.

A Pennsylvania Tunnel Finished.

The Pennsylvania Railroad has finished its tunnels under Bergen Hill and the Hudson River from Hackensack, N. J., to Seventh avenue and Thirty-third street, New York city. The final inspection has just been made and the work of electrification, track laying and signaling will now be pushed. We give a view of the inspectors, made from a photograph, taken in the tunnel.

The Hackensack portal is 6.1 miles from the junction with the main line at Harrison, just east of Newark, N. J. A temporary track has been laid from Harrison to the portal, and materials for the track will be carried over this line.



Automobile Party Making Final Inspection of the Pennsylvania Railroad's North River Tunnels.

Left to right:
First seat—F. J. Gubelman, Vice-President, Geo. B. Fry, General Supt., } O'Rourke Engineering & Construction Company.
Second seat—John F. O'Rourke, President, Jas. Forgie, Chief Asst. Engr., North River Division.
Third seat—A. J. County, Asst. to 2d Vice-President, Penn. R. R. Chas. M. Jacobs, Chief Engineer, North River Division. Samuel Rea, Second Vice-President, Penn. R. R.

Thus culminates the work on the first pair of tunnels to be built for trunk line service under the Hudson River. The first excavation was begun May 12, 1905. The north tunnel was joined on September 12, 1906, and the south tunnel on October 9, 1906. The tunnels under Bergen Hill were connected on May 7, 1908, and April 11, 1908, respectively.

The tunnels are 23 ft. in exterior diameter, and are lined with 2 ft. of concrete. They extend from the Hackensack portal under Bergen Hill to Weehawken shaft, a distance of 1.2 miles, and from the latter shaft to Ninth avenue, New York, 1.4 miles. In their construction, 501,995 cubic yards of material has been excavated; and 1,201,000 lbs. of blasting powder has been used. All of the subaqueous tunneling was done under compressed air, and for this purpose, 3,770,000,000 cubic ft. of air was pumped into the tunnels. For use in drilling operations, 212,420,000 cubic ft. of compressed air was used. The tunnels contain 64,265 tons of cast iron and steel; 740 tons of structural steel; 2,606 tons of steel bolts; 240,500 barrels of cement; 170,400 cubic yards of concrete; 4,980 cubic yards of brick work, and 346.1 miles of wire conduits.

Engines That Won't Set Forest Fires.

The state Public Service Commission of New York, Second district, in accordance with its recent order, has made inspections of all locomotives to be used within the forest preserve this summer. Among the requirements decided upon are the following:

Spark Arresters.—To have openings in netting not exceeding 2½ x 2½ meshes per inch, with No. 10 wire. No holes to be permitted in any point of the spark arrester, diaphragm, baffle plate or joints larger than the standard opening given by this netting. Overflows from injectors to be connected to ash pans so that live coals which drop from the grates will be extinguished.

Ash Pans.—Openings securely protected with screens or guards. Ash pan slides, connections, etc., to be in good condition with no openings larger than ⅜ in. x ⅜ in.

The spark arresters and ash pans of 101 locomotives were inspected upon the following railways:

Brooklyn Cooperage Company	2
Cranberry Lake Railroad	1
Delaware & Hudson	23
New York Central	59
New York & Ottawa	10
Horseshoe Forestry Company	3
Paul Smith's Electric Light & Power & R.R. Co.	1
Rich Lumber Company	2

At the first inspection 43 per cent. of the locomotives examined failed to meet the requirements. Practically all of the locomotives on the Mohawk & Malone division of the New York Central are in good condition, and this has resulted in a substantial saving in fuel, which has more than offset the increased cost of inspection and experimenting made necessary by the order of the commission.

New Construction on the Central Pacific.

The Southern Pacific has under way the construction of a new line 30.87 miles long from Rocklin, Cal., to Colfax, both points being on the Central Pacific. The object of the work is to get a maximum grade of 1.5 per cent., compensated for curves, opposing eastbound trains in place of the grade of the present road, which is 2 per cent. maximum, not compensated, and therefore equivalent to something more than 2.2 per cent. compensated. When the new road is done, the intention is to use it for eastbound traffic, and to have a double track between the points mentioned by using the present road for westbound —downgrade—traffic.

The work involves the construction of 17 tunnels, aggregating 18,136 ft., the longest of which is 3,205 ft. All tunnels are single track except one, which is double track and 1,000 ft. long. The new line will be shorter than the present road by three-quarters of a mile, and will have 4,149 deg. less curvature.

Work is proceeding with all available force. It was let in two contracts for grading and masonry and tunneling, about one-half to the Utah Construction Co., Ogden, Utah, and one-half to Erickson & Petterson, San Francisco, Cal.

Iowa Railroad Commission.

In its annual report recently printed the Railroad Commission of Iowa asks for legislation to give it authority to require the elimination of grade crossings, to extend switching zones in cities, and to compel reasonable changes in the location of highways where they cross railway tracks, in order that an undergrade or overhead crossing may be constructed in lieu of a grade crossing.

Extensive Floods in Missouri.

Extensive floods in Missouri on July 7 did great damage to railways, highways, bridges and crops. A despatch from St. Joseph reported hundreds of thousands of acres of wheat and corn destroyed. The Wabash Railroad bridge at Chillicothe was washed away. At Gault, Mo., the station was surrounded by water, and the agent was not rescued for 15 hours. At Gallatin six track laborers, sent out to protect a bridge from driftwood, were reported missing. Near Burlington Junction a passenger train of the Chicago, Burlington & Quincy was derailed and had to be left standing in the water. At Pomona, Kan., passenger train No. 5 of the Atchison, Topeka & Santa Fe was derailed on an embankment and three passenger cars were overturned and lodged in 18 ft. of water. Only two of the 300 passengers in the train were reported injured. On the same day there were numerous floods and landslides in Colorado. In the Royal Gorge, the trains of the Denver & Rio Grande were blocked by landslides from 6 ft. to 20 ft. deep.

Hundreds of passengers were detained in Kansas City awaiting the movement of their trains. For six days or more all trains that were run between Kansas City and Chicago were detoured over the Missouri Pacific via St. Louis.

Oil Fuel in Texas.

The Southern Pacific Company has contracted for another year's supply of fuel oil for the locomotives on the main and branch lines between New Orleans and El Paso. The oil will be furnished through the Rio Bravo Oil Company, which is a subsidiary concern of the Southern Pacific, and the supply will be obtained from the Eastern Texas and Western Louisiana oil fields. The proposition to use coal instead of oil on the Galveston, Harrisburg & San Antonio between El Paso and Houston was under consideration for a time. It was planned to obtain the coal from the Dawson fields of New Mexico, which are owned by the Phelps-Dodge syndicate. After a thorough investigation it was found that while there is a falling off in the oil output of Texas and Louisiana it would be possible to obtain an adequate supply at prices lower than the cost of coal. The continued use of oil was preferred in several other respects aside from its cheapness. It is thought that by the time the present oil contract expires other oil fields in the territory adjacent to the road will have been discovered and that the supply of this fuel will thus be kept up.

Barge Canal Contracts.

At Albany two barge canal contracts, aggregating an expenditure of $3,759,291, have been awarded. Contract No. 30, providing for the construction of the canal, river and land line, from Little Falls to Sterling Creek, fourteen miles, goes to the Acme Engineering & Contracting Company of Schenectady for $2,591,666. Contract No. 42, providing for the construction of the canal from the Herkimer-Oneida county line to Oriskany road, nine miles, was awarded to Shanley-Morrisey, Inc., of New York, for $1,164,625.

New Vessels for Savannah Line.

The Ocean Steamship Company, better known as the Savannah Line, is to build two steamships to run between New York and Savannah. They will be slightly larger than the City of Savannah. The keel of one ship will be laid next month. They will be single screw steamers with reciprocating engines, and will be among the handsomest vessels on the Coast. They will have unusual freight carrying capacity and will have accommodation for 136 first cabin, 36 second cabin and 63 steerage passengers.

Operating Agreement of Northwestern Roads.

The Northern Pacific, the Chicago, Milwaukee & St. Paul, and the Oregon & Washington (Union Pacific), have entered into an agreement for the joint use of tracks between Portland and Seattle. Leaving Portland, trains of the Union Pacific will cross the Columbia river on the new bridge of the Spokane, Portland & Seattle, and will run over the tracks of the Northern Pacific to Tacoma. The Chicago, Milwaukee & St. Paul has built a line between Seattle and Tacoma. The Oregon & Washington has bought a half interest in

this line, and the two roads will operate it jointly. The Northern Pacific, of course, will use its own line for its trains between Tacoma and Seattle. The line of the Northern Pacific between Portland and Tacoma will be double-tracked. This line will also be used by the Great Northern.

The Hill and the Harriman interests have also settled the terms upon which they jointly will use the line running from Greenville, Idaho, to Riparia, Wash., via Lewiston, Idaho. The line from Greenville to Lewiston has been built by the Union Pacific and the line from Lewiston to Riparia by the Northern Pacific. The two roads will own and operate the line jointly.

Cement Products Exhibition Company.

The dates for the third annual cement show, in the Coliseum, Chicago, have been changed from February 17-23, 1910, to February 18-26, 1910.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Denpison, Penna. Co., Toledo, Ohio
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York: second Friday in month: New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N.Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York: Oct. 18-22; Denver, Colo.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod. Montreal, Que.; irregular. usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Libery St., New York; 2d Friday in January, March, May, Sept. and Nov.: Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month; except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month; except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago; Sept. 7-8; Fort William Henry, Lake George, N. Y
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St.; Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Railroad Commission of Missouri has indefinitely suspended its proposed schedule of reasonable maximum rates on coal.

The Kansas City newspapers state that ticket scalping has been revived there since the railways began again to sell reduced rate round-trip tickets.

A meeting of the committee on uniform classification of the National Association of Railway Commissioners has been called to be held in Chicago, on August 2d.

The Delaware, Lackawanna & Western announces that on August 1 local passenger fares within the state of Pennsylvania will be advanced to the basis of 2½ cents a mile.

The Lehigh Valley, the Delaware, Lackawanna & Western and the New York Central are now carrying freight from New York to Buffalo in 17 hours or thereabouts. The trains leave New York in the evening and are made up of express cars. The design is to carry only high-class freight.

The first through freight trains via the Chicago, Milwaukee & St. Paul and the Chicago, Milwaukee & Puget Sound between Chicago and Tacoma, Wash., started from Chicago on the evening of July 12. The westbound schedule will be 176 hours from Chicago and 144 hours from the Twin Cities.

Five men arrested at Plainfield, N. J., for speculating in commutation tickets of the Central of New Jersey, lending them for use by transient passengers at less than single ticket rates, have been set free on payment of the costs of the court and on promising not to traffic in commutation tickets.

Competition for passenger business between the Chicago-St. Paul lines once more is growing feverish. The Chicago, Milwaukee & St. Paul on July 11 put on a new passenger train between Chicago and the Twin Cities, which leaves Chicago at 8 p. m. and arrives at St. Paul at 7:25 a. m. This train makes 1 hour and 10 minutes better time than the "Pioneer Limited." The Chicago & North Western promptly replied by announcing a new train, the Fast Mail, which leaves Chicago at 8:04 p. m. and reaches St. Paul at 7:30 a. m.

The Interterritorial Ticket Contract Committee met in Atlantic City, N. J., on July 8, 9 and 10. A revised report on an excursion ticket contract and a report on a form of one-way ticket contract were adopted for submission to the American Association of General Passenger and Ticket Agents. Sub-committees representing the general passenger agents' and accountants' associations conferred and appointed a joint sub-committee to investigate the various forms of tickets and suggest measures for a reduction in the number of forms now required. This sub-committee is composed of W. J. Cannon, assistant general passenger agent of the Chicago, Milwaukee & St. Paul; W. S. Cookson, assistant general passenger agent of the Grand Trunk; A. Hermany, auditor of passenger traffic of the Chicago, Rock Island & Pacific, and A. D. Joslin, auditor of passenger receipts of the Illinois Central.

W. P. Kenney, assistant traffic manager of the Great Northern, has issued a circular to coal shippers, dealers and consumers in Minnesota, North Dakota, South Dakota, Iowa and Manitoba, calling attention to the importance of getting coal during July and August when cars are available, in order to prevent a shortage of transportation facilities in the fall. The indications point towards an exceptionally heavy grain and other traffic movement. Mr. Kenney's circular is one of numerous indications that railway traffic and operating men in central and western territory are growing apprehensive of a serious car shortage in the late summer and fall. It is said that the roads from the Pittsburgh district to the lakes are considerably congested now and that this condition is due mainly to the fact that there has been great delay in beginning the movement of coal to the Northwest. Much freight is now being handled which ordinarily goes forward earlier in the summer.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1909.
(See also issue of July 9.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Atlanta, Birmingham & Atlantic	642	$113,318	$39,492	$163,608	$26,816	$29,490	$12,302	$77,858	$7,602	$154,068	$9,540	.....	$8,000	$1,540	‡$25,096
Baltimore & Ohio	3,992	4,489,528	1,080,337	5,931,065	920,526	968,607	140,925	1,968,501	128,522	4,127,081	1,803,984	$48,631*	171,275	1,584,077	678,406
Bangor & Aroostook	514	151,332	39,329	200,761	38,960	30,110	2,263	60,355	9,658	141,346	59,415	.....	.....	59,415	‡28,660
Buffalo, Rochester & Pittsburgh	568	546,474	74,576	644,356	48,993	88,618	9,627	177,573	14,150	338,962	305,395	229*	.....	305,166	235,168
Central of Georgia	1,916	489,233	220,111	780,809	107,965	169,754	28,558	247,356	41,450	595,083	185,726	5,998	40,500	151,224	66,284
Chicago & Alton	998	578,325	302.140*	965,953	84,211	68,357	40,124	310,254	29,041	531,987	433,966	435*	35,000	398,531	65,675
Chicago & Eastern Illinois	965	620,687	125,334	787,822	59,931	103,264	20,350	283,814	43,112	510,471	277,351	1,069*	26,500	249,782	112,237
Chicago, Indianapolis & Louisville	616	303,038	118,366	458,783	62,740	71,448	13,152	146,796	13,825	307,961	150,822	.....	22,500	128,322	65,393
Chicago, Milwaukee & St. Paul	7,516	3,211,593	955,530	4,566,232	780,733	564,396	117,226	1,766,265	88,396	3,317,016	1,249,216	920*	206,640	1,041,656	210,720
Cincinnati, Hamilton & Dayton	1,036	460,708	125,118	651,715	111,191	116,625	20,333	270,520	23,659	542,328	109,387	.....	25,833	83,553	67,081
Florida East Coast	584	235,017	77,748	388,894	25,193	35,357	4,037	99,092	6,998	170,677	218,217	.....	12,350	205,867	136,349
Galveston, Harrisburg & San Antonio	1,338	514,898	192,655	752,404	92,144	104,615	26,810	321,824	30,180	575,573	176,831	1,065*	28,179	147,587	41,848
Grand Rapids & Indiana	591	246,329	103,070	373,674	58,986	67,197	10,797	147,776	13,604	298,360	75,314	1,512*	21,132	52,669	5,828
Illinois Central	4,518	2,963,051	847,114	4,371,875	615,352	642,269	97,098	1,535,660	105,840	2,996,219	1,375,656	2,713*	186,609	1,186,333	174,956
International & Great Northern	1,159	439,582	136,230	616,303	135,545	115,871	17,304	274,250	20,289	563,259	53,044	.....	17,000	36,044	106,417
Iowa Central	558	175,058	41,068	227,301	43,421	53,083	9,110	105,323	9,040	219,977	7,324	.....	7,548	224†	‡8,084
Lake Erie & Western	724	277,667	55,138	349,863	71,429	75,349	11,336	130,756	9,743	298,613	51,250	.....	17,000	34,250	52,004
Maine Central	931	434,518	207,721	689,899	142,705	102,223	8,578	234,804	20,492	508,802	181,097	1,877	31,962	151,013	60,757
Minneapolis & St. Louis	1,028	205,908	77,092	306,571	71,379	51,040	10,597	123,317	11,210	267,543	39,028	109*	16,458	22,461	49,559
Nashville, Chatt. & St. Louis	1,230	652,291	190,999	911,995	180,210	151,053	34,022	323,136	25,486	713,907	198,089	13	20,668	177,434	42,786
New York, Chicago St. Louis	556	656,125	129,928	814,105	98,322	86,800	46,787	305,675	12,564	550,147	263,958	1,901*	26,000	236,057	50,675
New York, Ontario & Western	546	511,531	104,517	641,556	77,046	109,608	7,532	235,058	13,516	442,760	198,796	469*	17,000	181,327	‡72,750
Norfolk & Southern	582	146,367	51,502	210,704	45,096	24,602	4,276	64,806	12,679	151,459	59,245	1,503*	5,200	52,542	11,280
Northern Pacific	5,695	3,650,501	1,451,772	5,451,967	998,751	615,472	92,900	1,671,598	85,262	3,463,983	1,987,984	26,694	190,817	1,823,861	‡235,119
Oregon R. R. & Nav.	1,327	592,419	293,270	959,952	135,267	84,621	33,774	294,146	29,164	576,972	382,980	9,367*	58,798	314,815	‡243,808
Oregon Short Line	1,456	1,014,351	390,767	1,504,189	216,920	167,742	18,559	279,209	27,136	709,566	794,623	1,141*	50,000	743,482	2,407
Philadelphia & Reading	1,006	2,428,090	569,756	3,134,003	331,526	584,694	35,189	945,645	57,410	1,954,464	1,179,539	53,688	60,777	1,172,450	2,282
St. Louis Southwestern	773	386,527	91,805	503,099	41,527	61,418	22,833	128,660	23,316	277,754	225,345	829*	15,118	209,398	114,016
St. Louis Southwestern of Texas	697	179,122	56,763	254,785	70,218	57,442	8,496	114,568	15,505	266,229	11,444*	187*	8,333	19,964†	‡81,421
San Pedros, Los Angeles & Salt Lake	1,099	423,107	234,343	697,922	70,422	102,101	26,982	220,545	16,110	436,160	261,762	2,652*	23,452	235,658	39,084
Southern Pacific—Pacific System	5,616	4,078,624	2,329,689	6,899,543	857,861	901,501	120,456	1,795,365	182,780	3,857,963	3,041,580	1,833	223,863	2,819,550	98,976
Southern Pacific—Atlantic S. S. Lines	...	503,719	40,319	553,603	.....	.....	.....	.....	.....	449,394	104,209	5,199	.....	109,408	134,488
Texas & Pacific	1,885	722,388	279,135	1,062,934	190,795	200,112	15,759	467,177	33,872	907,715	155,219	994*	38,000	116,225	100,283
Union Pacific	3,310	2,698,523	798,134	3,944,915	556,668	436,304	73,086	884,370	94,024	2,044,452	1,900,463	5,121*	112,008	1,783,334	287,987
Wabash	2,515	1,418,945	500,385	2,103,073	363,188	339,689	71,991	855,208	65,540	1,695,616	407,457	1,977*	64,495	340,985	‡3,799
Yazoo & Mississippi Valley	1,371	474,769	156,701	676,537	184,358	85,201	16,129	269,018	26,279	580,985	95,553	2,062	30,835	66,780	59,236
ELEVEN MONTHS OF FISCAL YEAR.															
Atlanta, Birmingham & Atlantic	642	$1,384,524	$411,357	$1,911,283	$252,372	$335,342	$113,559	$766,442	$83,774	$1,551,489	$359,794	.....	$79,000	$280,794	‡$32,572
Baltimore & Ohio	3,992	49,172,819	11,818,245	64,831,438	8,111,125	9,926,681	1,465,661	22,477,460	1,357,084	43,338,011	21,493,427	$499,322*	1,881,380	19,112,725	3,246,751
Bangor & Aroostook	514	2,022,024	508,333	2,654,734	461,729	306,979	31,045	794,072	114,122	1,707,947	946,787	.....	15,000	931,787	229,313
Buffalo, Rochester & Pittsburgh	568	5,397,395	809,882	6,449,473	717,341	1,481,153	92,190	1,921,878	148,493	4,361,055	2,088,418	19*	145,000	1,943,399	163,891
Central of Georgia	1,916	6,979,392	2,519,104	10,405,577	1,433,317	1,974,507	292,241	3,200,189	406,916	7,307,170	3,098,407	55,778	444,258	2,709,927	384,409
Chicago & Alton	998	7,115,162	3,499,043	11,567,817	1,103,829	1,252,853	432,581	3,727,359	329,746	6,846,368	4,721,449	10,813*	340,000	4,370,636	654,552
Chicago & Eastern Illinois	965	7,374,767	1,536,247	9,451,490	944,894	1,575,942	187,030	3,362,382	389,964	6,460,212	2,991,278	16,419*	247,614	2,727,245	92,217
Chicago, Indianapolis & Louisville	616	3,182,098	1,223,038	4,847,146	715,320	781,604	138,399	1,622,117	149,547	3,406,987	1,440,159	.....	238,500	1,201,659	149,988
Chicago, Milwaukee & St. Paul	7,516	38,994,904	11,572,572	54,912,827	6,507,551	6,697,460	1,209,837	19,975,581	980,585	35,371,014	19,541,813	155,791	2,222,054	17,475,550	1,034,517
Cincinnati, Hamilton & Dayton	1,036	5,018,421	1,487,437	7,254,620	926,390	1,375,806	234,655	3,122,033	232,305	5,891,189	1,363,431	.....	279,023	1,084,408	491,523
Florida East Coast	584	1,523,491	1,075,780	3,070,805	397,004	420,713	60,335	1,028,043	90,301	1,996,396	1,074,409	.....	125,100	949,309	453,101
Galveston, Harrisburg & San Antonio	1,338	6,750,346	2,030,513	9,250,547	1,194,758	1,199,967	255,224	3,654,913	298,784	6,603,646	2,646,901	16,077*	233,581	2,397,243	784,036
Grand Rapids & Indiana	591	2,578,930	1,377,853	4,252,661	507,004	657,985	111,164	1,684,769	150,020	3,110,942	1,141,719	4,997*	231,929	904,793	125,605
Illinois Central	4,518	33,279,749	9,938,499	49,429,662	5,742,764	10,646,134	1,074,365	17,149,939	1,064,991	35,678,193	13,751,469	29,586*	2,055,275	11,666,609	584,036
International & Great Northern	1,159	5,479,367	1,566,965	7,531,257	1,330,346	1,202,865	181,258	3,078,210	226,303	6,018,982	1,512,275	.....	225,000	1,287,275	1,128,294
Iowa Central	558	2,172,647	467,134	2,771,831	291,533	536,882	97,738	1,230,062	95,698	2,251,913	519,918	.....	81,531	438,387	‡343,525
Lake Erie & Western	724	3,065,802	697,050	3,975,990	584,736	814,732	118,492	1,560,109	110,958	3,189,027	786,963	.....	187,760	599,203	66,491
Maine Central	931	4,563,543	2,512,690	7,582,415	1,133,200	1,079,558	82,018	2,747,214	248,099	5,290,090	2,292,325	23,943	345,034	1,971,234	‡86,661
Minneapolis & St. Louis	1,028	2,575,722	970,016	3,819,221	418,067	530,102	111,370	1,423,528	132,056	2,615,123	1,204,098	409*	174,694	1,028,995	118,593
Nashville, Chatt. & St. Louis	1,230	7,245,347	2,268,000	10,224,879	1,594,326	1,803,381	376,641	3,644,140	257,661	7,676,149	2,548,729	6,593*	222,672	2,319,464	203,441
New York, Chicago St. Louis	556	7,053,529	1,303,207	8,642,563	867,495	963,059	482,731	3,495,242	143,776	5,952,303	2,690,260	14,110*	315,510	2,369,640	‡245,751
New York, Ontario & Western	546	5,906,298	1,375,466	7,570,841	828,903	1,288,134	105,182	2,814,195	158,942	5,195,356	2,375,485	37,675*	166,417	2,171,393	‡53,189
Norfolk & Southern	582	1,480,192	567,797	2,198,338	302,442	234,398	45,462	700,208	155,397	1,437,907	760,431	4,055*	65,200	691,176	351,461
Northern Pacific	5,695	43,173,692	15,491,737	62,313,050	7,010,566	7,289,582	806,960	18,267,391	995,698	34,370,197	27,942,853	400,414	2,491,192	25,852,075	‡472,681
Oregon R. R. & Nav.	1,327	7,815,001	3,078,970	11,597,646	1,218,736	826,792	265,987	3,217,110	318,469	5,847,094	5,150,552	32,975*	588,359	5,129,218	‡819,297
Oregon Short Line	1,456	11,486,274	3,700,133	16,154,940	1,489,762	1,549,805	203,333	3,084,587	326,771	6,654,258	9,500,682	3,294*	548,048	8,949,340	1,585,357
Philadelphia & Reading	1,006	28,796,050	5,586,625	35,877,440	2,959,121	6,898,376	388,154	10,893,812	611,167	21,750,630	14,126,810	401,319	670,799	13,857,330	440,104
St. Louis Southwestern	773	4,833,447	1,090,249	6,193,138	838,835	1,012,757	235,016	1,522,569	226,784	3,835,962	2,357,176	6,550*	165,323	2,185,303	168,641
St. Louis Southwestern of Texas	697	2,340,372	784,167	3,353,241	934,168	734,736	96,904	1,466,546	169,427	3,401,781	48,540*	2,652*	79,929	131,121†	235,669
San Pedros, Los Angeles & Salt Lake	1,099	3,961,687	2,309,564	6,695,179	931,786	927,893	276,775	2,190,177	185,416	4,512,047	2,183,132	28,115*	261,783	1,893,233	814,935
Southern Pacific—Pacific System	5,616	45,040,453	24,229,225	74,195,872	9,090,506	9,547,360	1,238,658	19,792,178	2,156,671	41,825,373	32,370,499	59,581*	2,556,708	29,754,210	3,845,358
Southern Pacific—Atlantic S. S. Lines	...	5,204,743	429,045	5,690,460	.....	.....	.....	.....	.....	4,913,183	777,277	60,466	.....	837,743	316,362
Texas & Pacific	1,885	9,253,535	3,392,136	13,541,268	1,682,214	2,128,394	167,638	5,353,339	369,317	9,700,902	3,840,366	19,737*	576,388	3,244,240	436,174
Union Pacific	3,310	30,262,516	8,840,051	42,881,024	4,307,355	4,512,944	932,901	10,138,853	1,098,118	20,990,171	21,890,853	26,025*	1,209,861	20,654,966	4,625,412
Wabash	2,515	15,781,195	5,825,052	23,566,599	2,832,015	3,650,692	759,788	9,175,936	749,858	17,168,289	6,398,310	19,886*	745,142	5,633,282	‡72,907
Yazoo & Mississippi Valley	1,371	6,576,631	1,915,506	9,037,482	1,874,823	1,582,585	174,326	3,476,422	264,006	7,372,162	1,665,320	28,622	361,715	1,332,227	‡83,960

*Deficit. †Loss. ‡Decrease.

Relations Between Railways and Coal Companies.

Commissioners Harlan and Clark of the Interstate Commerce Commission took testimony in Chicago last week regarding the relations between a number of western railways and coal mine operating companies. The testimony related not only to the subject of the control of coal mines by railways, but also to the subject of the plans followed by the roads in apportioning cars between the mines along their lines.

E. W. McKenna, vice-president of the St. Paul, testified that that road owns three coal mines in Illinois, producing 4,600 tons a day, all used by the road. The mines do no commercial business. In addition, the road has to buy large quantities of coal. So far as he knows, no one connected with the road is interested directly or indirectly in outside mines from which the road buys. E. S. Keeley, vice-president of the same road, said that it had refused to make joint rates on coal with many of its connections; this in order to insure market to the coal producers situated on its lines and keep its equipment at home. Geo. E. Simpson, superintendent of transportation of the St Paul, said he kept a record of the capacity of the different mines and supplied them with cars accordingly. In times of car shortage, the distribution of cars was based on previous experience of how many cars each mine used when it got all it wanted.

Clarence F. Parker, purchasing agent of the Illinois Central, denied that this road unfairly favors the Bell & Zoller Company of St. Louis. The only difference between the road's contract with this company and with other concerns is that it covers a period of 10 years instead of one year. The long-time contract was made because if the coal company were sure of a market for its lump coal, it could make a similar long-time contract with Swift & Company, the packers, for screenings, and the Illinois Central would get the haul. Mr. Parker is chairman of the Madison Coal Corporation. The Illinois Central controls this company through the Mississippi Valley Company, and the Madison furnishes from 15 to 20 per cent. of the coal the road uses. The Illinois Central contracts to pay the Madison company $1.10 a ton, and about the same price is paid to 80 other mine operators in Illinois. The testimony indicated that the road's control of the Madison Corporation practically enables it to fix the price that it will pay to other companies for coal. F. H. Harwood, coal traffic manager of the Illinois Central, produced claim papers showing that after the coal strike of 1906 he had refunded several hundred dollars of demurrage charges to the Bell & Zoller Company. The demurrage, he said, accrued on a large number of cars in which coal was stored in Chicago in anticipation of a strike. Similar refunds were made to all operators who applied for them.

Geo. H. Ross, vice-president of the Chicago & Alton and the Toledo, St. Louis & Western, said that he owned 50 shares of the stock of the Clover Leaf Coal Company. He said that 65 per cent. of the coal used by the Alton and the Clover Leaf in Illinois is obtained from the Shoal Creek Coal Company and the rest from the Clover Leaf Coal Company, but that neither has any connection with these roads.

W. H. McDoel, president of the Chicago, Indianapolis & Louisville, testified that this company owned no coal mines in Illinois.

M. D. Shaff, superintendent of the Chicago, Peoria & St. Louis, and S. M. Russell, superintendent of the Toledo, Peoria & Western, stated that neither their roads nor their officers are interested in coal concerns.

It was shown that the Dering Coal Company is controlled by the Chicago, Rock Island & Pacific Railway. The Rock Island owns $1,700,000 out of $5,000,000 of stock, and there is a voting trust agreement which entitles the road to name a majority of the directors. A number of the road's officers, including President Winchell, own similar amounts of stock, and the following own the number of shares indicated: John A. Spoor, president of the Chicago Junction Railway, 125 shares; W. E. Corey, president United States Steel Corporation, 200 shares; E. H. Gary, chairman United States Steel Corporation, 200 shares; T. W. Robinson, vice-president Illinois Steel Company, 75 shares. Messrs. Winchell, Corey, Spoor and Robinson, and W. H. Lyferd (C. & E. I.), John F. Stevens, W. B. McKinley (Illinois Traction Co.) and other railway men are bondholders.

Eugene McAuliffe, general fuel agent of the Rock-Island-Frisco System, said that the bulk of the coal used by these roads in Illinois comes from the Consolidated Indiana Coal Company, which is now leased to the Brazil Block Coal Company, controlled by the Chicago & Eastern Illinois. The mines of the Dering Company, which is now in the hands of a receiver, are also leased to the Brazil Block Coal Company. About 60 per cent. of the output of these mines is used by the Rock Island-Frisco lines at prices ranging from 55 cents for screenings to $1.15 for lump. The roads also buy coal from practically every mine on their lines.

J. S. Ford, auditor of the Chicago & Eastern Illinois, stated that the Evansville & Terre Haute owns the West Jackson Hill Coal Mining & Transportation Company, and that 600 acres of coal lands in Indiana are held in trust for the Eastern Illinois by the Chicago Title & Trust Company, but are not worked.

A list of stockholders of the Cardiff Coal Company, of Cardiff, Illinois, was filed by Chas. E. Pierce. This showed that T. P. Shonts owns $56,000 of stock and $56,000 of bonds, and that Paul Morton owns $31,200 worth of stock and $41,000 of bonds. Mr. Pierce said, however, that the Cardiff Company's output is all sold commercially, except about 200 tons a day, bought by the Wabash, and that it has no dealings with the Alton or the Clover Leaf.

J. M. Whitman, vice-president of the Chicago & North Western, stated that this road owns the Consolidated Coal Company and about 16,000 acres of coal lands in Iowa, but none in Illinois, and that, so far as he knows, none of the officers of the road are interested in other coal properties.

T. J. Hyman, secretary of the Illinois Steel Company, stated that the United States Steel Company and its subsidiaries, which operate a substantial mileage of railways, own 2,600 acres of coal lands in Illinois, and are getting more in Indiana.

Considerable testimony was introduced as to methods of distributing cars among coal mines. It appeared that some roads provided cars according to the estimated capacity of the mines and that others distributed them according to the past production of the mines.

W. E. Bailey, general auditor of the Atchison, Topeka & Santa Fe, said that this road owns $243,000 or bonds of the Devlin Coal Company in Illinois and coal properties in other states; but that none of its officers, agents or employees is interested in coal properties along its lines.

E. P. Higgins, auditor of disbursements of the Big Four, said that this road owns stock in the Chicago & Harrisburg Coal Company in Indiana. Officers of the Lake Erie & Western and the Chicago, Indiana & Southern, said that these roads have no interests in coal mines.

W. L. Barnes, superintendent of transportation of the Chicago, Burlington & Quincy, stated that this road owns 27,000 acres of coal lands in Illinois, but is operating no mines on it.

Francis S. Peabody testified that the Peabody Coal Company controls the Chicago & Illinois Midland railroad as well as the Illinois Midland Coal Company.

T. J. O'Gara, of the O'Gara Coal Company, stated that his company owns 13 mines in Saline County, Illinois, on the Big Four, and that one-half of their output is sold to the railways, one-third going to the New York Central lines. For two years the O'Gara Company has had a freight rate of 95 cents a ton to Chicago. The rate formerly was $1. He denied that there had been any private arrangement with the railways regarding rates.

Richard Fitzgerald, vice-president of the Chicago Junction railway, said that he owns the Grant Coal Mining Company, of Burnett, Indiana, but that it sells no coal to the railway.

W. T. Abbott, general attorney of the Southern Indiana and the Illinois Southern, stated that these roads have sold their coal properties.

INTERSTATE COMMERCE COMMISSION.

Another Exception to the Long and Short Haul Clause.

Moise Brothers Co. v. Chicago, Rock Island & Pacific et al. Opinion by Commissioner Harlan.

Complaint alleges that class and commodity rates to Santa Rosa, N. Mex., from Chicago, Kansas City, St. Louis and Memphis are unreasonable both in and of themselves and

when compared with the through rates from the same points of origin to El Paso, Tex. Under the circumstances disclosed complainant's contentions are not sustained.

Defendants having shown that competitive conditions at El Paso compelled lower rates thereto than to Santa Rosa, the burden of proof does not rest on them to justify their Santa Rosa rates. Having explained and excused violation of the long and short haul clause, the issue as to the reasonableness of the Santa Rosa rates must take the same course as any other issue involving the reasonableness of rates.

No Carload Rate on Shoes.

Bentley & Olmsted Co. et al. v. Lake Shore & Michigan Southern et al. Opinion by Commissioner Lane.

The commission declines to put in carload rates on boots and shoes between Boston and Des Moines, because those articles generally move in less than carload quantities and there is no evidence in the record warranting the introduction of a new unit of transportation as to those commodities.

Discrimination Against Des Moines.

Greater Des Moines Committee v. Chicago, Rock Island & Pacific. Opinion by Commissioner Lane.

Complaint alleges that defendant's local rates for the transportation of freight between Chicago and Des Moines are unreasonable and give undue advantage to Minneapolis and St. Paul as against Des Moines. No unreasonable preference or advantage in favor of Minneapolis and St. Paul has been established, but the present first class rate from Chicago to Des Moines is unreasonable.

Failure to Agree on Division of Rate.

Germain Co. v. New Orleans & Northeastern et al. Opinion by Commissioner Harlan.

A through rate regularly published between two points and available under the tariff over several different routes is not nullified as to one such route by the failure of the participating carriers to agree on divisions over that route.

Reparation awarded to complainant on account of a rate overcharge and to cover transfer and demurrage charges accruing because of the refusal of the delivering line to receive a car from its connection.

Goods Destroyed in Transit.

Anderson, Clayton & Co. v. St. Louis & San Francisco et al. Opinion by Commissioner Lane.

Complainant shipped 125 bales of cotton from Lawton, Okla., to Chickasha, for concentration and subsequent reshipment. Defendants' tariffs provided that on reshipment from the concentration point the through rate from point of origin to final destination would be protected. Consignment was destroyed by fire while standing on the platform of the compress at Chickasha. Complaint seeking refund of the local charges collected for the movement from Lawton to Chickasha dismissed.

Agreements Between Carrier and Shipper.

***H. P.** Hood & Sons v. Delaware & Hudson. Opinion by Commissioner Clements.*

Complaint alleged unjust discrimination and inadequate service in transportation of milk from Poultney, Vt., and intermediate stations to Eagle Bridge, N. Y., destined to Boston, Mass. After partial hearing an agreement covering all points in controversy was filed, and a tariff was issued based thereon. Upon disagreement of parties as to the interpretation of the tariff it was held that the commission has no authority to approve or enforce an agreement between carrier and shipper, nor will it undertake to construe such an agreement nor to say that a tariff shall be issued in compliance therewith. Such an agreement may be regarded, and used as evidence of an admission as between the parties executing it, of strong evidentiary value, that the rate agreed on is reasonable. It is the duty of the commission to establish just and reasonable rates available for all shippers alike without discrimination in favor of any shipper by reason of an agreement with the carrier. When the language of a tariff is ambiguous the agreement may be examined as a medium of explanation of the tariff to remove the ambiguity.

When a commodity is purchased in and shipped from one state to a point in another state the transaction is indelibly impressed with the character of interstate commerce, and the various mutations through which the article passes and the handlings which it undergoes while in transit are merely incidental to the movement. Every carrier by railway that participates in the carriage of any such commodity or that performs any part of the transportation in a continuous passage from a point of origin in one state to a destination in another state is engaged in interstate commerce and subject to the jurisdiction of the act.

Reparation will be awarded in accordance with findings on proper proof of shipments.

Reduction of Rates to Des Moines.

Greater Des Moines Committee, Inc., v. Chicago, Rock Island & Pacific et al. Opinion by Commissioner Lane.

Freight which originates at points east of the Indiana-Illinois state line is carried to Des Moines, Iowa, over the Chicago, Rock Island & Pacific on a joint proportional rate to the Mississippi river added to a proportion made by the Rock Island from the river to Des Moines. The proportionals of the Rock Island on first, second, etc., class merchandise are as follows:

Group No.	Class / Originating at—	Merchandise. No. 1, cts.	No. 2, cts.	No. 3, cts.	No. 4, cts.	No. 5, cts.
1	Including New York	42	34	27	21½	15½
2	" Syracuse	40	34	27	20½	15½
3	" Pittsburgh	45½	35½	30	22½	15
4	" Dayton	47½	38½	31	24	15
5	" Saginaw	40	33½	26½	20	14½
6	" Detroit	42	36½	29½	23	17
7	" Grand Rapids	42	36½	29½	21½	16½
8	" Logansport	45½	37½	32	24	16
9	" Fort Wayne	42	33½	29½	22	16
10	" Cincinnati	47	39½	34½	26	17

The commission finds these rates unreasonable and the other class rates unreasonable in about the same proportion and orders them reduced as follows:

Group No.	Class / Originating at—	Merchandise. No. 1, cts.	No. 2, cts.	No. 3, cts.	No. 4, cts.	No. 5, cts.
1	Including New York	37	30	23½	19	13½
2	" Syracuse	35	30	23½	18	13½
3	" Pittsburgh	40	31	26	20	13
4	" Dayton	41½	33½	27	21	13
5	" Saginaw	35	29	23	17½	12½
6	" Detroit	37	32	26	20	15
7	" Grand Rapids	37	32	26	19	14½
8	" Logansport	40	33	28	21	14
9	" Fort Wayne	37	29	26	19	14
10	" Cincinnati	41	34½	30	23	14½

Other class rates are reduced about in proportion. The application for a joint through rate is denied.

Law of Limitations Interpreted.

Woodward & Dickerson v. Louisville & Nashville et al. Opinion by Chairman Knapp.

The defendant asks for rehearing of the commission's construction of the amendment to the act approved June 29, 1906, placing a limitation on actions for the recovery of money damages, which reads as follows: "All complaints for the recovery of damages shall be filed with the commission within two years from the time the cause of action accrues, and not after, and a petition for the enforcement of an order for the payment of money shall be filed in the circuit court within one year from the date of the order and not after, provided that claims accrued prior to the passage of this act may be presented within one year."

The shipments involved in this case were made in November and December, 1905, and the payment of freight charges was made to the delivering carrier on December 26, 1905. Complaint was filed with the commission September 5, 1907, less than two years after the cause of action accrued, but more than one year after the passage of the amendment referred to.

The question raised has already been decided by the com-

mission in several cases. Prior to the enactment of the amendment of 1906, apparently the limit upon actions for money damages before the commission depended on the statute of the state in which the cause of action arose. But having established a new limitation of two years, it is apparent that many claims not barred at that time would have been barred before they could be filed, had not congress inserted the proviso in question. It has therefore seemed more reasonable to assume that the congress intended to give one year within which there might be presented to the commission claims valid prior to the approval of the law, but which would thereupon have been barred without notice, than to assume that the congress, in respect of claims not barred by the new limitation, should create two classes, and say that those which accrued subsequent to August 26, 1906, might be presented at any time prior to the expiration of two years from that date, while claims which accrued perhaps immediately prior to the date mentioned could be presented only within one year thereafter. The petition for rehearing is therefore denied, and it will be so ordered.

Protecting Minimum Weights.

Slimmer & Thomas v. Pennsylvania Company et al. Opinion by Commissioner Prouty.

Complainants ordered cars of certain dimensions for shipments of cattle from South St. Paul, Minn., to Hammond, Ind. The initial carriers supplied cars of larger dimensions, but protected the minimum weights of the sizes ordered. At Hammond the cattle were rebilled to Philadelphia, Pa., on a separately established tariff, and payment of freight charges to Hammond was made to the western lines. The lines east of Hammond declined to protect the minimum weights, as the provisions of their tariffs had not been complied with. Complaint asking for reparation should be dismissed.

Sugar Lighterage Allowance at New York.

Federal Sugar Refining Co. of Yonkers v. Baltimore & Ohio et al. Opinion by Chairman Knapp.

Defendants have prescribed limits in and about New York harbor within which they will, for the flat New York rate, perform the service of transporting traffic between their rail terminals on the Jersey side of the Hudson and points in the harbor. At Yonkers, N. Y., some distance north of the free-lighterage limits, complainant operates a sugar refinery, and to make shipments therefrom over defendants' lines it must lighter the sugar from its refinery to points within the lighterage limits or forward it via the New York Central to Sixtieth street, New York. By the latter route it can obtain the New York rate, but the route is said to be unsatisfactory because of delays in the New York Central's city terminals. One of the defendants' leased terminals in Brooklyn is owned and operated by the same partnership which operates a sugar refinery in competition with complainant, the sugar from this refinery passing through the terminal and the partnership receiving from defendants for lighterage thereof the same amount allowed for lighterage of other freight by the same terminal company. It is claimed by complainant that on shipments delivered by it to defendants' Jersey rail terminals it should receive the same allowance that is made to companies lightering freight from points in New York harbor, or that the lighterage limits should be extended to include Yonkers.

By their lighterage regulations defendants have, in the only available manner, extended their lines to New York, but such extension results from the exercise of business discretion, not from compliance with any requirement of the act to regulate commerce; and by such extension defendants incur no liability, under the act, to extend their lines to Yonkers or other nearby communities.

The identity of ownership between the Jay street terminal in Brooklyn and the adjoining refinery in Brooklyn is a relationship which should be subjected to the closest scrutiny. The only inference which can be drawn from the present record is that the Jay street terminal does not earn in excess of a reasonable return on the investment. Section 15 of the act clearly implies that a just and reasonable allowance may be made to the owner of property transported, when such owner renders a service connected with the transportation, and nothing has been made to appear which indicates that the allowance in question exceeds the authorized measure of compensation. Complaint dismissed without prejudice.

Refund on Reshipment Unlawful.

W. S. Duncan & Company et al. v. Nashville, Chattanooga & St. Louis Railway Company et al. Opinion by Commissioner Clements.

The payment of the so-called "elevation allowance" to dealers in hay, grain and grain products at Nashville, Tenn., is an undue and unlawful discrimination.

Where carriers have in effect a uniform rate per 100 lbs. for any quantity, which rate applies uniformly to all shippers, a different rate applied to carloads from that applied to L. C. L. will not be ordered, especially when such differential will have a tendency to increase the rate on L. C. L., and further, to cut off consumers and small dealers from purchasing at distant markets in L. C. L. lots.

Shipments of grain, grain products and hay are carried from the Ohio and Mississippi river crossings and points north and west thereof to Nashville at local rates, and quantities of these articles are afterwards reshipped and rebilled from Nashville to points in the southeast at the local rate, but the difference between the sum of the locals thus collected and the through rate from crossing point to ultimate destination is refunded to the shipper through the claims department of the railway. There is no agreement for through carriage between shipper and carrier at the original point of shipment, no other destination than Nashville is named, and on delivery of grain to that point it loses its identity and is in every respect a local shipment. The circumstances and conditions prevailing at Nashville are not so dissimilar from those prevailing at other points in the southeast as to warrant a continuance of this privilege at Nashville without undue discrimination against points in that territory not having a similar privilege, and this privilege operates as a device by which traffic may move at less than the lawful tariff rate.

Reparation from Charge of Published Rate Denied.

The Alphons Custodis Chimney Construction Co. v. Southern Railway et al. Opinion by Commissioner Cockrell.

The defendant agreed to publish a rate of 18 cents per 100 lbs. on carload shipments of stack chimney brick from North Birmingham, Ala., to Washington, D. C., as soon as complainant should tell them when shipments were ready to move, the rate at that time being 20 cents. The complainant failed to tell the defendant until after certain shipments had been made. Reparation for the difference between the 20-cent rate and the 18-cent rate is denied on shipments that moved before the publication of the 18-cent rate.

STATE COMMISSIONS.

The Railroad Commission of Iowa has announced that on July 20 it will give a hearing on a number of applications for changes in freight rates. Railway officers have asked for the cancellation of the commission's recent order requiring railways to bill cars at the minimum weight of the car ordered by the shipper when they are unable to furnish cars of the size ordered.

The Railroad Commission of Louisiana has submitted to the roads in that state a tentative mileage tariff on corn and oats, and will give a hearing on the question of the adoption of this tariff at Baton Rouge on July 27. The commission on the same date will give a hearing regarding the matter of rates on melons, fruits and vegetables. It proposes the following rule regarding rates on these commodities: "The rates on native grown, green or ripe fruits, melons and vegetables, in carloads, minimum weight 20,000 lbs. per car, shall be Class C, Western classification, and Class C, Southern classification, in defined territories where these classifications

apply, provided that the maximum rate to be charged shall not exceed 30 cents per 100 lbs. On less than carload shipments of green or ripe fruits, melons and vegetables, transported over a single line of railway, or over two or more lines of railway under the same management or control, rates shall be as follows, except in cases where existing rates are lower, in which cases existing rates shall remain in effect: fourth class, Western classification, and fourth class, Southern classification, in defined territories where these classifications apply. Carload rates apply on fresh fruit and fresh vegetables in boxes, bags, barrels or crates or in baskets, with tight or slatted covers, straight or mixed. On melons, straight."

COURT NEWS.

The state of Oregon is proceeding in the courts against the Corvallis & Eastern for failure to comply with an order of the state railroad commission to supply adequate station facilities at Lyons. The penalty provided by law is $10,000. Instead of putting up a building, the company took a couple of old freight cars and rigged them up as a station.

In a petition for rehearing in the Southern Pacific tax case which he has filed in the Kentucky Supreme Court, M. B. Hays, former attorney-general of Kentucky, charges that in order to effect a compromise this road paid counsel for the fiscal court of Jefferson county a fee of $3,344. In this case the state sued for $4,000,000, which was alleged to be due for back taxes. Mr. Hays, in addition, charges that the Southern Pacific "indirectly paid to have the suit of the commonwealth, by T. C Albritton, revenue agent, versus Southern Pacific Company, for taxes for 1905, dismissed without prejudice."

Judge E. B. Kinkhead, of the Common Pleas Court at Springfield, Ohio, has ruled that the Ohio Railway Commission has no judicial power and therefore exceeded its authority when it ordered the Marietta, Columbus & Cleveland to stop discriminating against the Carbon Coal Company in favor of the Black Diamond Coal & Coke Company in the distribution of cars. The commission ordered that cars should be distributed according to the capacity of the mines along the road's lines. The court decided not only that the commission exceeded its authority in issuing such an order but also that the rating of the coal mines on the basis of their supposed capacity for all time is unreasonable, unjust and calculated to foster, rather than to prevent, discrimination.

The United States Circuit Court of Appeals at Cincinnati, Ohio, rendered a decision on July 7 that the Wabash must pay $900,000 to the estate of Henry L. Compton, this being the principal and compound interest on $150,000 of bonds issued by the road in 1870 and bought by Mr. Compton. In 1865 the Toledo & Wabash Railway Company was consolidated with three other roads and became known as the Toledo, Wabash & Western. Prior to 1878 the consolidated lines defaulted on the interest on the equipment bonds of the old Toledo & Wabash. In July, 1880, Benjamin F. Ham secured a judgment and lien against the whole consolidated lines for these bonds that he held. The Supreme Court of the United States reversed the decision in 1885, holding that there was no lien on the consolidated properties. In 1888 James Compton obtained a decree from the Ohio Supreme Court, granting him a lien on the consolidated roads for the old bonds he held, under the Ohio statutes. This case came before Judge William H. Taft and H. H. Lurton, of the United States Circuit Court of Appeals, in Cincinnati in 1890; they sustained the Ohio Supreme Court decision as to the lien, but could not agree as to the form of remedy. The United States Supreme Court also upheld in this case the Ohio Supreme Court decision, notwithstanding the lien granted in the Ham case was declared void. The Compton case being remanded from Washington to the United States Circuit Court for the Northern District of Ohio, W. H. H. Miller, of Indianapolis, was appointed special master to ascertain what property was covered by the lien ten years ago. In the meantime the Wabash, St. Louis & Pacific had been placed in the hands of a Federal receiver, and in 1889 the Wabash took all the properties. Special Master Miller found profits to pay Compton, and his report was upheld in the United States Circuit Court of Appeals.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Captain J. W. Miller, vice-president of the New England Navigation Co., has been elected vice-president of the Cape Cod Canal Co.

A. L. Conrad has been elected the secretary and auditor of the Kansas Southwestern, with office at Topeka, Kan., succeeding H. R. M. Smith.

S. M. Rogers, purchasing agent of the Elgin, Joliet & Eastern, at Chicago, has been elected the vice-president, with office at Chicago. He will perform such duties as may be assigned to him by the president or board of directors.

Blewett Lee

Blewett Lee, whose appointment as the general solicitor of the Illinois Central, with office at Chicago, has been announced in these columns, was born on March 1, 1876, near Columbus, Miss. He received his education at the Agricultural and Mechanical College of Mississippi, 1880-1883; the University of Virginia, 1883-1885; Harvard University, 1885-1888, and at Leipsic and Freiburg, Germany, 1888-1889. On January 1, 1902, he became general attorney of the Illinois Central, and held this office until his appointment on June 15, 1909, as the general solicitor.

James H. Hoyt, assistant to the president of the Toledo & Ohio Central, second vice-president and general counsel of the Hocking Valley, and general counsel of the Kanawha & Michigan, has been elected the second vice-president of the Kanawha & Michigan. W. N. Cott, secretary and treasurer of the Hocking Valley, the Wellston & Jackston Belt and the Zanesville & Western, with office at Columbus, Ohio, has been elected the secretary and treasurer of the Kanawha & Michigan. L. P. Ecker, auditor of the Hocking Valley and the Zanesville & Western, with office at Columbus, Ohio, has been appointed the auditor of the Kanawha & Michigan.

Operating Officers.

C. E. Dafoe, superintendent of the Northwest division of the Chicago Great Western at St. Paul, Minn., has had his jurisdiction extended over the Wisconsin, Minnesota & Pacific division, succeeding Charles T. Banks, resigned.

E. A. Goodridge has been appointed general manager of the Texas State Railroad, with office at Rusk, Tex. Mr. Goodridge will report to the State Penitentiary Board, the road being a part of the penitentiary properties.

H. W. Cutshall has been appointed the superintendent of telegraph of the El Paso & Southwestern, with office at El Paso, Tex. He will have supervision over all matters pertaining to the telegraph and telephone traffic and maintenance, company and commercial.

Traffic Officers.

A. M. Dudley has been appointed a contracting agent of the Norfolk & Western, with office at St. Louis, Mo.

A. G. Sheer has been appointed the chief of tariff bureau of the Atchison, Topeka & Santa Fe System, with office at Chicago.

T. J. Connell has been appointed a district passenger agent of the Southern Railway with office at St. Louis, succeeding C. C. Stewart, promoted.

E. O. Jennings has been appointed a traveling freight agent of the Seaboard Air Line, with office at Charlotte, N. C., reporting to commercial agent.

J. F. Drews has been appointed a traveling freight agent of the New York, Chicago & St. Louis, with office at Ft. Wayne, Ind., succeeding W. A. Frey, promoted.

A Lackawanna Line agency has been established at Seattle, Wash., and C. E. Hall has been appointed the agent at that place and F. H. Montgomery, the traveling agent.

George Leach, rate clerk of the Chicago, Burlington & Quincy at New York, has been appointed a contracting freight agent of the Illinois Central, with office at New York.

F. A. Curry has been appointed a commercial agent of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with office at Buffalo, N. Y.

F. R. Sullivan, commercial agent of the Michigan Central at St. Louis, Mo., has been appointed a commercial agent of the New York Central Lines, with office at Los Angeles, Cal.

E. C. Campbell, commercial agent of the Delaware, Lackawanna & Western at New Haven, Conn., has been transferred to Cleveland, Ohio, succeeding Charles F. McTague, promoted.

Geo. B. Wright has been appointed a traveling freight agent of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with office at Boston, Mass.

R. F. Hoag, chief clerk to the contracting freight agent of the Delaware, Lackawanna & Western at Syracuse, N. Y., has been appointed a contracting freight agent, with office at Syracuse.

Paul Escott, traveling passenger agent of the Missouri Pacific at Chattanooga, Tenn., has been appointed a traveling passenger agent at Louisville, Ky., succeeding J. A. Steltenkamp, promoted.

J. A. Ellis, general agent of the Chicago Great Western at Omaha, Neb., has been appointed an agent at Chicago, succeeding J. D. Tuohy, resigned. E. R. Beem succeeds Mr. Ellis, with office at Omaha.

W. F. Yeo, traveling passenger agent of the Pennsylvania Lines at Denver, Colo., has been transferred to Salt Lake City. He is succeeded at Denver by R. V. Jones, the traveling passenger agent at Madison, Wis. L. B. Poore succeeds Mr. Jones.

L. Sevier, who recently resigned as vice-president of the Seaboard Air Line, has been appointed the freight traffic manager of the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern, with office at Birmingham, Ala., succeeding G. P. Biles.

H. G. L. Campbell has been appointed the division freight agent of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville, and the Northern Ohio, succeeding T. O. Baker, assigned to other duties, and the office of division freight agent has been moved from Lima, Ohio, to Sandusky.

J. P. Wesner has been appointed the general eastern agent of the Clearfield Route, a fast freight line which operates over the Central of New Jersey, the Philadelphia & Reading, the New York Central & Hudson River, and the Buffalo, Rochester & Pittsburgh, with office at New York, succeeding H. S. Burgesser.

J. W. Koester has been appointed agent of the Traders' Despatch, with office at Seattle, Wash., succeeding A. J. Mengel, assigned to other duties. The territory of this agency is extended and will include the state of Washington (except points immediately on the north bank of the Columbia River), the northern part of Idaho and the state of Montana.

A. R. Bogan, formerly chief rate clerk of Atchinson, Topeka & Santa Fe at Galveston, Tex., has been appointed chief rate clerk of the Southern Pacific in the freight department of the New Orleans offices. E. G. Cobb, acting chief rate clerk, will resume his duties as the division freight and passenger agent of the Louisiana Western and Morgan's Louisiana & Texas Railroad & Steamship Co., at Lake Charles, La.

It was stated in these columns last week that W. A. Frey, traveling freight agent of the New York, Chicago & St. Louis, at Fort Wayne, Ind., had been appointed a traveling freight agent of the Delaware, Lackawanna & Western, with office at Binghamton, N. Y. The statement should have been that Mr. Frey had been appointed a traveling agent of the Lackawanna Line with office at Binghamton, N. Y., succeeding C. E. Hall, transferred.

Hector M. McGinnis has been appointed a traveling agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at Vancouver, B. C., in charge of freight and passenger traffic in British Columbia, Revelstoke and west, including the line from Revelstoke to Arrowhead, reporting to F. W. Parker, general agent at Seattle, Wash. Emmett J. Carland has been appointed a traveling agent, with office at Butte, Mont., in charge of passenger traffic on lines of the Northern Pacific and Great Northern, west of Mandan, N. Dak., and Minot, and east of De Smet, Mont., and Columbia Falls, reporting to E. A. Gray, general agent at Helena, Mont.

Charles R. Capps, whose appointment as freight traffic manager of the Seaboard Air Line, with office at Norfolk, Va., was recently announced in these columns, was born March 4, 1871, at Norfolk, Va. He was educated at Roanoke College and began railway work in the general freight and passenger agent's office of the Seaboard Air Line, serving in various clerical positions, including chief rate clerk and chief clerk. He was appointed general freight agent of the Seaboard Air Line July 12, 1895, and on the consolidation of the Seaboard Air Line, the Florida Central & Peninsula, and the Georgia & Alabama in July, 1900, was appointed general freight agent of the consolidated company, the Seaboard Air Line Railway, which position he held until his recent appointment as freight traffic manager in charge of the freight traffic, industrial, mail and express departments of the Seaboard Air Line and subsidiary companies. He is also acting temporarily as traffic manager of the Baltimore Steam Packet Co.

Charles R. Capps.

H. B. Dunham, traffic manager of the Hocking Valley and the Zanesville & Western, with office at Columbus, Ohio, has been appointed the traffic manager of the Kanawha & Michigan, with office at Columbus, with supervision of the freight and passenger traffic, succeeding Hudson Fitch, resigned. W. H. Fisher, general passenger agent of the Hocking Valley and the Zanesville & Western, has been appointed the general passenger agent of the Kanawha & Michigan, with office at Columbus, succeeding Moulton Houk, resigned. H. Q. Wasson, general freight agent of the Hocking Valley and the Zanesville & Western, has been appointed the general freight agent of the Kanawha & Michigan, with office at Columbus, succeeding E. L. Jamison, resigned.

Charles A. De Saussure, whose appointment as assistant general passenger agent of the Southern Railway, with office at Memphis, Tenn., was recently announced in these columns, was born September 21, 1846, at McPhersonville, Beaufort District, S. C. At the outbreak of the Civil War he was attending the grammar school of Beaufort College and the following March he entered the Confederate army. He began railway work in November, 1877, in the office of the joint northwest passenger agent of the Nashville, Chattanooga & St. Louis

and the Western & Atlantic, and in June, 1880, became chief rate and division clerk of the Nashville, Chattanooga & St. Louis at Nashville, Tenn. In March, 1885, he was appointed assistant general passenger agent of the East Tennessee, Virginia & Georgia at Knoxville, Tenn., and the following year went to the Memphis & Charleston as assistant general passenger agent at Memphis, Tenn, remaining in this position until June, 1894, when he was appointed chief clerk to the general passenger agent, and the following January was made general passenger agent. In March, 1898, he became division passenger agent of the Southern Railway, which position he held until his recent appointment.

Engineering and Rolling Stock Officers.

A. M. Van Auken has been appointed the resident engineer of the Jonesboro, Lake City & Eastern in charge of maintenance of track, bridges and buildings, with office at Blytheville, Ark.

C. Setzkorn, district car inspector of the Chicago, Rock Island & Gulf at Dalhart, Tex., has been appointed a general car foreman of the Chicago, Rock Island & Pacific at Cedar Rapids, Iowa.

J. W. Keenan, supervisor of the Pennsylvania at New Bethlehem, Pa., has been appointed supervisor of division No. 33 of the Western Pennsylvania division of the Pittsburgh division, succeeding C. Z. Moore, transferred.

A. V. Manchester, assistant district master mechanic of the Chicago, Milwaukee & St. Paul at Minneapolis, Minn., has been appointed a master mechanic of the Chicago, Milwaukee & Puget Sound, with office at Miles City, Mont.

C. Kyle has been appointed the general master mechanic, eastern lines, of the Canadian Pacific, with office at Montreal, Que. C. W. Van Buren, division car foreman at Montreal, has been appointed the master car builder, eastern lines, with office at Montreal.

A. W. Whiteford, shop superintendent of the Lehigh Valley at Sayre, Pa., has been appointed to the new position of assistant to the superintendent of motive power, with office at South Bethlehem, Pa. A. M. McGill, general inspector of motive power and rolling stock, succeeds Mr. Whiteford.

Charles E. Chambers, whose appointment as general master mechanic of the Central of New Jersey, with office at Jersey City, N. J., was recently noted in these columns, was born on October 18, 1865, at Augusta, Hancock county, Ill. He received his education in the public schools of Illinois and began railway work in the bridge and building department of the Chicago, Burlington & Quincy in July, 1883, and was later in the shops of the same company. He subsequently became fireman and then locomotive engineer, remaining at that work until his appointment in June, 1901, as road foreman of engines on the Philadelphia & Reading. About a year later he was appointed general road foreman of engines on the Central of New Jersey, and in October, 1902, was appointed master mechanic of the Central division of the Central of New Jersey, with office at Jersey City, which position he held until his recent appointment as general master mechanic.

Charles E. Chambers.

J. M. FitzGerald, signal engineer of the Boston & Albany at Boston, Mass., has been appointed the engineer of maintenance of signals, with office in south station, Boston, Mass., reporting to the general superintendent. W. H. Elliott has been appointed the signal engineer, with office at Albany, N. Y., reporting to the assistant general manager at Boston.

J. Holland, roadmaster of the San Antonio division of the Missouri, Kansas & Texas, with office at Smithville, Tex., has been transferred to the Houston division, with office at Houston, succeeding R. L. Hatfield, resigned. J. R. Woods, roadmaster of the Austin division, with headquarters at Smithville, will succeed Mr. Holland, and J. C. McMahon succeeds Mr. Woods.

D. E. Fitzgerald, for the past five years chief clerk to the general superintendent of motive power of the St. Louis & San Francisco at Springfield, Mo., and not D. W. Fitzgerald, master mechanic of the Galveston, Harrisburg & San Antonio at El Paso, Tex., as previously announced, has been appointed the assistant general superintendent of motive power of the St. L. & S. F., with office at Springfield.

OBITUARY.

E. Ryder, general superintendent of the Chicago, Indiana & Southern, died at Atlantic City, N. J., on July 8.

W. J. Byrth, general agent of the Great Northern at Cincinnati, Ohio, and formerly president of the National Association of Freight Traffic Agents, died in Cincinnati recently. At the time of his death Mr. Byrth was a member of the Cincinnati Common Council.

C. M. Hicklin, the general western agent of the Mallory Steamship Company, with office at Denver, Colo., died at Denver on July 1. Mr. Hicklin had been general western agent of the Mallory line for 18 years. Before that he was a general agent of the Atchison, Topeka & Santa Fe, with office at St. Joseph, Mo.

Thomas Hayward, one of the six men who organized the Brotherhood of Locomotive Engineers, and the first president of the organization, died in Marshall, Mich., recently at the age of 87. During his 37 years as engineman only two persons were killed by his engine, in both cases the victims having gone to sleep on the rails.

Thomas B. Davis, 93 years old, who died at Baltimore just before the Fourth of July, was present on July 4, 1828, when Charles Carroll, of Carrollton, laid the cornerstone of the Baltimore & Ohio Railroad at Baltimore. Mr. Davis was then a boy of 11, and signed the charter of the company, along with his father, who was a shareholder, a share having been issued to him, at the suggestion of Carroll, in order to make him eligible as a signer.

Milton W. Bahn, vice-president and general manager of the Stewartstown Railroad, died at York, Pa., July 6, after a brief illness. He was born on June 26, 1839, at Hellam, Pa., and was educated at the York County Academy and the Millersville State Normal School at Lancaster. After teaching school for six years he went into mercantile business at New Freedom, and later became agent for the Northern Central and general manager for the Stewartstown Railroad. He was also a director of the New Park & Fawn Grove.

E. Clark Luce, assistant general passenger agent of the Lake Shore & Michigan Southern, with office at Cleveland, Ohio, died at Cleveland on July 7. Mr. Luce began railway work on November 3, 1854, as a clerk in the general ticket department of the Cleveland & Toledo, and was consecutively to 1857 a clerk in the treasury department; 1857 to 1858, a clerk in the auditor's office; 1858 to Oct. 1, 1864, general accountant; Oct. 1, 1864, to 1874, successively general ticket agent and assistant general passenger and ticket agent of the Lake Shore & Michigan Southern Ry., which absorbed the Cleveland & Toledo Ry.; 1874 to Jan. 1, 1886, in charge of passenger accounts in the auditor's office; Jan. 1, 1886, to Jan. 1, 1887, general ticket agent of the entire road, and Jan. 1, 1887, to his death, assistant general passenger and ticket agent.

Railroad Construction.

New Incorporations, Surveys, Etc.

Bellville & Mascoutah Traction.—Incorporated in Illinois, with $150,000 capital and office at Mascoutah, to build from Bellville east to Mascoutah, in St. Clair county, about 10 miles. The incorporators and first board of directors include: E. J. Cole and A. Knobeloch, of Bellville; E. R. Hagist, G. J. Scheve and P. W. Liel, of Mascoutah.

Buffalo Southern (Electric).—According to press reports this company will build about eight miles to complete its line from Buffalo, N. Y., east to East Aurora.

Canadian Roads.—According to press reports from Winnipeg, Man., final estimates on the construction of the Hudson Bay Railway from Pas Mission, north of Lake Winnipegosis, in Keewatin, to either Fort Churchill or the mouth of the Nelson river on Hudson Bay, will be turned over to the government this month. The report will include the cost of the work, the quantities and grades of material to be used, together with maps and plans showing the final location and profiles of the two routes.

Central California Traction.—An officer of the Northern Electric writes that the Central California, now under construction from Stockton, Cal., north to Sacramento, is to form a connection between the Northern Electric and the Atchison, Topeka & Santa Fe. The line is already in operation from Stockton to Lodi. It is expected to finish the entire line by January 1.

Central Pacific.—See Southern Pacific.

Chicago, Burlington & Quincy.—An officer writes that it is expected to begin work soon on an extension from Herrin, Ill., south to Metropolis, on the north bank of the Ohio river, 57 miles, and to have the line ready for operation early next year. The Herrin Southern was recently incorporated in Illinois with a capital of $100,000 to carry out this work. The incorporators are: D. Willard, D. A. Howard and L. V. Larson, of Chicago; F. E. Ward, of Evanston, and J. N. Dering, of La Grange.

Chicago, Milwaukee & St. Paul.—An officer writes that a large amount of money is to be spent for double-tracking the lines out of Milwaukee, Wis., to Elmgrove. At a later time the other lines are also to be double-tracked.

According to press reports, improvements will be made between Kansas City, Mo., and Ottumwa, Iowa. Concrete bridges and arches are to be put in to replace the present wooden structures, and about 46 miles of the 85-lb. track is to be replaced with 90-lb. sections. One of the important improvements is protection against flood. This is to be accomplished by raising the tracks an average of five feet from a point one and one-half miles east of the Clay county approach of the Mississippi river bridge to a point two miles east of Birmingham.

Cincinnati, Louisville & Indianapolis (Electric).—Incorporated in Indiana, with $100,000 capital, to build a line connecting Cincinnati, Louisville and Indianapolis. J. C. Hooven, C. B. Hooven, W. B. Mayo, F. B. Shutts and W. Hargitt are directors.

Colorado & Southern.—The Cheyenne, Wyo., City Council has granted the franchise asked for by the Colorado Railway to lay tracks across Capital avenue, the present terminus of the Holdrege-Cheyenne line of the Chicago, Burlington & Quincy. (July 2, p. 34.)

Colorado Railway.—See Colorado & Southern.

Creston, Winterset & Des Moines.—A reorganization of company is said to have been accomplished, and money raised to build from Creston, Iowa, northwest via Macksburg to Winterset, 30 miles. An extension is also to be built to Des Moines. It is said that a contract will be let to Judd & Ross, of Chicago, for the first section. R. Browne, president, Creston; J. M. Wilson, first vice-president, Macksburg; M. E. Harris, second vice-president, Winterset; W. W. Walker, treasurer, Macksburg; A. S. Lynn, secretary, Orient.

El Reno Interurban.—An officer writes that a bonus of $10,000 was recently given by the city of Yukon and work is now under way from Oklahoma City, Okla., east to Yukon. It is expected to open this section about May, 1910. The line is eventually to be extended east to Shawnee. H. Dittner and H. Schafer, El Reno, may be addressed.

Everett & Cherry Valley Traction.—According to press reports from Monroe, Wash., construction work is to be started at once on a line from Monroe up the Snoqualmie valley. This is an old project, of which J. T. McChesney, of Everett, Wash., is the principal promoter. It is thought that the present plans are being backed by the Great Northern. Contract is said to be let to Caughren, Winter, Smith & Co., Seattle, for grading and bridge work on the first 30 miles.

Fort Smith & Arkoma.—An officer writes that surveys have been made by T. A. Bailey, of Fort Smith, Ark., for the first two miles of this proposed line, projected from Fort Smith southwest via Panama, Okla., to Wilburton, about 65 miles. Work is now under way on the terminals. W. F. May & Co. have the contract for building the first mile. There will be one steel bridge. A. J. Yoke, president, Fort Smith. (July 2, p. 34.)

Garden City, Gulf & Northern.—An officer writes that grading and bridge work is now under way on this line, projected from Plains, Kan., north via Garden City, Scott and Russell Springs to St. Francis, about 255 miles. Track laying was to be started July 15. Contract for grading let to Hopkins & Renick, of Garden City; for rails, to the Colorado Fuel & Iron Co., and for ties and lumber, to the McShane Lumber Co., of Omaha, Neb. There is to be a 1,000-ft. steel bridge over the Arkansas river. B. M. McCue, president; E. A. Tennis, secretary, and Wardell Bros., chief engineers, Garden City. (July 2, p. 34.)

Grand Rapids & Nekoosa (Electric).—Work, it is understood, will be started at once by the Knox Construction Co. on a line from Grand Rapids, Wis., southwest to Nekoosa, about 15 miles. Neil Brown, president, Wausau, Wis.

Grand Trunk Pacific.—An officer writes that the contracts recently let for branch lines from Melville, Sask., are as follows: To McMillan Brothers & Kenny, of Winnipeg, Man., for about 35 miles from Melville southwest toward Regina; to Rigby & Hyland, of Frederickton, N. B., who will also have an office at Winnipeg or Melville, for 25 miles, from Melville northeast to Yorkton. These lines are to be built by the Grand Trunk Pacific Branch Lines Company as feeders for the main line. (July 2, p. 34.)

Contract is said to have been given Foley, Welsh & Stewart and work is to be started at once on 200 miles of the main line from the McCleod river, Alberta, west to the Rocky mountains.

Great Northern.—According to press reports from Helena, Mont., plans have been filed in Montana for a line from Poplar, Mont., in Valley county, north into Saskatchewan, Canada.

See Everett & Cherry Valley Traction.

Gulf, Texas & Western.—Projected from Burrs Ferry, Tex., on the Sabine river, northwest to Benjamin, on the Kansas City, Mexico & Orient in Knox county, about 500 miles, with a branch through Fort Worth. An officer writes that work is now under way from Jacksboro west to Olney. It is the intention to build through Dallas, either via Terrell or Kaufman, using the old Dallas & New Mexico grade, via Tyler, to southeast Texas. Rails have been bought for about 110 miles, to be laid in Jack and Young counties. On the completion of the Jacksboro-Olney section it is the intention to build northwest to Benjamin. (Mar. 19, p. 654.)

Hannibal & Jefferson City Interurban Traction.—Organized in Missouri, with $4,620,000 capital and office at Mexico, to take over the rights and property of the Mexico, Santa Fe & Perry Traction, organized about a year ago, to build from Mexico, Mo., to Perry. The new owners propose to build from Hannibal, in Marion county, southwest through Ralls, Monroe, Audrain, Callaway and Boone counties, thence southeast to Jefferson City, in Cole county, with branch lines east to Fulton and Hereford and other points in Callaway county.

120 miles. Located for 103 miles. Contracts said to be let to the Missouri Engineering Co., of St. Louis, newly organized with a capital of $100,000, of which De Groot Van Baekeman is president, representing the James Stewart Construction Co., of New York. It is the intention of the construction company to begin work at once. F. C. Sharp and J. F. McDermott, of St. Louis; C. F. Clark, S. J. Buckner, S. P. Emmons and S. Locke, of Mexico; J. P. Hinton, W. J. Roth, J. T. Holme, F. T. Hodgdon and C. H. Northam, of Hannibal; J. O. Allison and C. P. Lamb, of New London; Judge T. F. Murry, Hereford; J. A. Stewart, Columbia, and J. H. Atkinson, Fulton, are interested.

HANNIBAL & NORTHERN MISSOURI (ELECTRIC).—Incorporated in Missouri, with $2,000,000 capital, to build from Hannibal, Mo., on the Mississippi river west via Palmyra, Philadelphia, Bethel, Sue City, La Plata and Gibbs to Kirksville, about 100 miles. Captain F. W. Latimor, president, of Galesburg, Ill. H. Hunk, of Clarence, Mo., is interested.

HELPER WESTERN (ELECTRIC).—Incorporated in Utah, with $15,000 capital, to build from the Denver & Rio Grande at a point two miles southeast of Helper, Utah, northwest through Carbon county. J. F. Williamson, president, Salt Lake City; C. L. Crandall, vice-president; H. B. Tyrrall, secretary and treasurer, of Provo; G. W. Higgins, Clinton, Ind., and J. A. Thorne, Springfield, are directors.

HERRIN SOUTHERN.—See Chicago, Burlington & Quincy.

HUDSON BAY RAILWAY.—See Canadian Roads.

INTERSTATE RAILWAY (ELECTRIC).—This company has secured about 80 per cent. of the right-of-way for its projected line from Kansas City, Mo., north via Dearborn, to St. Joseph, 48½ miles. An injunction was recently obtained restraining the George Townsend-C. F. Enright syndicate and the Missouri River & Cameron Railroad from building or trespassing upon the right-of-way of the Interstate Railway, on which work is to be begun this month. (June 25, p. 1545.)

JAMES RIVER VALLEY & NORTHWESTERN.—Incorporated in South Dakota, with $5,000 capital and office at Huron, to build from Blunt, S. Dak., on the Chicago & North Western, north via Onida to Gettysburg, 35 miles. This is said to be a project of the Chicago & North Western. The incorporators include: M. Hughitt, B. S. Cleveland, W. A. Gardner, J. M. Whitman and J. D. Caldwell, of Chicago, and A. K. Gardner, of Huron.

KENTUCKY ELECTRIC.—An officer writes that this company was organized with a capital of $10,000 and has surveys made from Providence, Ky., south to Dawsonsprings, 20 miles. The line will eventually be extended east to Madisonville. J. T. Edwards, president; W. G. Roney, secretary, Providence. (July 2, p. 35.)

LEMHI & SALMON VALLEY.—See Oregon Short Line.

MARKED TREE, NEWPORT & WESTERN.—Organized in Arkansas, with $300,000 capital, to build from Marked Tree, in Poinsett county, on the St. Louis & San Francisco, west via Harrisburg and Waldenburg to Newport, in Jackson county, on the Chicago, Rock Island & Pacific and the St. Louis, Iron Mountain & Southern, 49 miles. E. Ritter, president, Jonesboro. The incorporators include W. W. Cate, J. H. Harrison, of Jonesboro; M. W. Hazle, W. B. Miller and N. Fisher, of Marked Tree; J. C. Mitchell, secretary; J. A. Bradsher and L. C. Going, of Harrisburg, and C. B. Bailey, of Wynne.

MEXICAN ROADS.—Joseph Kimball, second vice-president of the Mexican-American Holding Co., of Salt Lake City, Utah, is quoted as saying that E. H. Harriman has no connection with the applicants for a concession to build a line from Oaxaca, Oax., southeast to Salina Cruz, on the Pacific coast, thence westerly along the coast via Acapulco and Zihuatanejo to Manzanillo. The company owns the Oaxaca & Ejutla, in operation from Oaxaca south to Ejutla, 43 miles. A company has been organized to carry out the work with $40,000,000 capital and officers as follows: Captain E. A. Seely, president, New York; Senator Jose Castellot, first vice-president, City of Mexico; Joseph Kimball, second vice-president; Charles Hamilton, third vice-president; Roswell E. Briggs, secretary and treasurer, City of Mexico. T. W. Diamond and Judge G. W. Bartch, in addition to the above officers, are the directors.

MILWAUKEE WESTERN ELECTRIC.—An officer writes that the general contract has been given to the Chapman Company, of Chicago, and surveys are just being finished from Milwaukee, Wis., northwesterly via Butler, Templeton, Sussex, Merton, North Lake, Alderly, Neosho, Hustisford and Juneau to Beaver Dam, 66 miles, with a branch from Sussex via Pewaukee to Waukesha. Construction work will probably be started within the next three months. V. Zimmerman, Jr., president, Mitchell Street Bank, Milwaukee. (June 25, page 1545.)

MISSOURI RIVER & CAMERON.—See Interstate Railway.

NATIONAL RAILWAYS OF MEXICO.—According to press reports, plans have been made to widen the gage of the Interoceanic, between Mexico City, Mex., and Vera Cruz. The work is to be carried out during the next 12 months.

NEBRASKA, KANSAS & SOUTHERN.—An officer of the Kansas Railway Construction Co., of St. Louis, Mo., building the first 15 miles of the N., K. & S. from Garden City, Kan., northeast, writes that all the grading has been finished and track laying is now in progress on this section. The line is eventually to be extended to Stockton, in all about 162 miles, but no further work is to be carried out until definite financial arrangements are made. (April 29, p. 918.)

NORTHERN ELECTRIC.—See Central California Traction.

NORTHERN PACIFIC.—According to press reports from North Yakima, Wash., surveys are now being made for the Toppenish, Simcoe & Western, incorporated to build from Toppenish west to Fort Simcoe, about 30 miles. (May 21, p. 1099.)

OHIO ROADS (ELECTRIC).—W. H. Ogan is negotiating with residents of Celina, Ohio, and Portland, Ind., to build an interurban line between these two places, about 25 miles.

OREGON SHORT LINE.—An officer writes that it is uncertain when work will be started on the Lemhi & Salmon Valley, recently incorporated to build in Idaho. The projected route is from Lewiston southeast along the Little Salmon river, thence east along the Salmon river to Salmon, 280 miles; thence south to Cerro Grande, 148 miles, with branches as follows: From Salmon southeasterly to Challis, 51 miles; from a point about 40 miles north of Cerro Grande east to Camas, 35 miles. W. H. Bancroft, president, and William Ashton, chief engineer, Salt Lake City, Utah. (July 2, p. 35.)

Contract is said to have been let to the Utah Construction Co. for a branch in Idaho from a point six miles from Blackfoot southwest along the west bank of the Snake river to Aberdeen, 30 miles. Also for a change of location in the main line in the City of Idaho Falls, where it is proposed to eliminate a big curve through the city and over the Snake river on the Butte line. The contract includes a large amount of yard and station work in Idaho Falls. There is to be a new steel bridge built over the Snake river, which is not included in the contract.

PASCAGOULA & NORTHERN.—Organized in Mississippi, with a capital of $5,000,000 and office at Moss Point, Miss. A 36-mile line has been bought from a lumber company, which is to be extended four miles at each end, forming a through line from Scranton, on the Louisville & Nashville, north via Moss Point to Evanston, on the Mobile, Jackson & Kansas City.

PENNSYLVANIA.—See item under General News regarding this company.

PENNSYLVANIA LINES WEST.—Two contracts are said to have been let recently, one for seven miles and one for ten miles of a 17-mile double-track line between Richmond, Ind., and Indianapolis, to Brendhuger & Co. and Drake & Stratton, Philadelphia, Pa. The combined contract is worth about $3,000,000.

REDFIELD & SOUTHWESTERN.—Organized in South Dakota, with $2,000,000 capital, to build from Pierre, S. Dak., northeast via Oneida and Redfield, through Hughes, Sully, Hyde, Hand, Spink, Day and Roberts counties to Brown Valley, Minn., about 200 miles. The incorporators include H. P. Packard, W. S. Clark, Z. A. Crain, P. Norbeck and E. O. Issenhuth, of Redfield; J. H. Gropenheiser and L. E. Snyder, of Onida.

Red River Valley & Hudson Bay.—Incorporated in Minnesota, with $500,000 capital, to build a line to connect Oslo, Minn., in the western part of Marshall county, on the Minneapolis, St. Paul & Sault Ste. Marie, north following the Red river to St. Vincent, in the northwestern part of Kittson county on the Great Northern, about 70 miles. Rights of way secured through St. Vincent, Hill, Red River, Telin, Eagle Point and Big Woods. A. C. Twein, president; B. E. Herseth, secretary, and E. Englebretson, treasurer, of Kittson county.

Rochester & Mars (Electric).—An officer writes that plans are made to begin work in September from Mars, Pa., west through Adams and Cranberry townships, Butler county, and New Sewickly and Rochester townships, Beaver county, to Rochester, 16 miles. Surveys made, rights-of-way and franchises secured. J. H. Barrett, president and chief engineer; W. H. Boggs, treasurer; D. R. Torrence, secretary; D. Hunter, Jr., and J. G. Downie, all of Pittsburgh.

Roswell & Eastern.—An officer writes that plans are made to build from Oklahoma City, Okla., southwest via Seymour, Texas, through the Pecos valley to El Paso. W. H. Bockman, Seymour, Tex., may be addressed.

St. Louis, Oklahoma & Gulf.—According to press reports from Texas application has been made for a charter to build from Paris, Texas, south via Tyler to Beaumont. The Rock Island & Gulf Construction Co. is said to have been incorporated to build the line. M. J. Healy, care of the Commercial Club, Tyler, Tex., may be addressed. (See St. Louis, Oklahoma & Texas, June 11, p. 1230.)

San Luis Southern.—Incorporated in Colorado, with $1,000,000 capital, to build lines in southern Colorado and northern New Mexico. F. E. Brooks, president, Colorado Springs; G. Hughes, vice-president and treasurer, Denver, and H. A. Smith, secretary, Colorado Springs. A number of eastern capitalists, including Senator William Lorimer, of Illinois; Congressman Weeks, of Massachusetts, and former Indian Commissioner Leupp are said to be interested.

Southern Pacific.—Work is now under way on a new line from Rockland, Cal., north to Colfax, on the Central Pacific, 30.87 miles. The work includes the piercing of 17 tunnels, aggregating 18,136 ft., the longest of which is to be 3,205 ft. The improvements are being made to secure easier grades. Contract for one-half the work let to the Utah Construction Co., of Ogden, Utah, and to Erickson & Petterson, of San Francisco, for the other half. See item under General News regarding this company.

Springfield, Beardstown & Quincy (Electric).—Surveys are said to be under way and bids are wanted for a line from Springfield, Ill., west via Beardstown to Quincy. The incorporators and board of directors include: H. E. Colby, R. E. Browne and C. V. Houghton, of Petersburg; J. T. Tolan, of Farmingdale; G. S. Harnsberger, of Springfield, and W. T. Gates, of St. Louis, Mo.

Texas Roads.—According to press reports J. P. Nelson is negotiating with business men of San Antonio, Tex., to build 250 miles of line. The proposed route is from San Antonio north via Fredericksburg to Brady, 130 miles, thence north to a point not yet determined.

Timpson & Henderson.—According to reports, this is the new name of the Timpson & Northwestern, which recently amended its charter and has been reorganized. The new owners have bought a 11½-mile logging line from Ragley, Tex., to Pinehill, which is to be extended from Pinehill west to the International & Great Northern at Henderson, about 25 miles. (May 7, p. 1008.)

Timpson & Northwestern.—See Timpson & Henderson.

Toppenish, Simcoe & Western.—See Northern Pacific.

Wisconsin & Northern.—Work is said to have been started by the McDonnell-O'Connor Company on an extension to complete the line from Shawano, Wis., north to Wolfe River. The present plans call for an extension further north to Crandon, which it is expected will be finished by January, 1910. It is also proposed to build from Shawano south to Bear Creek. (June 25, p. 1546.)

Railroad Financial News.

Atchison, Topeka & Santa Fe.—The report that this road has bought the Roscoe, Snyder & Pacific is officially denied.

Atlanta, Birmingham & Atlantic.—Clark, Dodge & Co. and Moffat & White, both of New York, have bought the $3,250,000 two-year 5 per cent. receivers' certificates recently authorized. The certificates are a first lien on the entire property, including terminals, subject only to $4,090,000 Atlanta & Birmingham 5 per cent. bonds of 1904, and no other issue of certificates may be created before providing for the payment of the present issue.

Baltimore & Ohio.—See Cincinnati, Hamilton & Dayton.

Boston & Albany.—R. L. Day & Co., Estabrook & Co. and Kidder, Peabody & Co. are offering at 101½ the unsold portion of $4,500,000 four per cent. bonds of the Boston & Albany. The bonds are guaranteed principal and interest by the New York Central & Hudson River, which in 1900 leased the property of the Boston & Albany for 99 years, for interest on bonds, taxes, expenses and guaranteed dividends of 8 per cent. on the $25,000,000 stock.

Canadian Northern.—Lazard Brothers & Co., London, recently offered £600,000 ($3,000,000) 4 per cent. first mortgage debenture stock, principal and interest unconditionally guaranteed by the government of Saskatchewan, and £600,000 ($3,000,000) 4 per cent. first mortgage debenture stock, principal and interest guaranteed by the government of Alberta. The offering price was 97½.

Chicago Great Western.—The United States Circuit Court on July 10 issued a final decree authorizing the sale at public auction of the property of the Chicago Great Western at an upset price of $12,000,000. (June 18, p. 1330.)

Cincinnati, Hamilton & Dayton.—The secretary of the company makes the following statement in regard to the plan of readjustment:

"The plan of readjustment has received the approval of a very large majority of the creditors of the company, and it now seems probable that it may be carried through without a foreclosure sale of the property. If so, the assent of a majority of the stockholders will also be required before the plan can be carried out, and this involves, under the Ohio laws, a 30-day advertisement. In order to save delay on account of that requirement of the law and be ready for corporate action in case requisite further assents of creditors are given, the directors have authorized the commencement of the 30-day publication at this time. In case requisite further assents of creditors are not given the meeting can be abandoned, and there will then have to be a reorganization through a sale under mortgage foreclosure or other judicial proceeding."

The time for the deposit of 4½ per cent. notes expired July 11, and of the $15,000,000 notes outstanding 95 per cent. had been deposited.

Eastern Pennsylvania Railways.—Julius Christensen, Philadelphia, is offering at 93, to yield about 5½ per cent., the unsold portion of $100,000 first mortgage 5 per cent. bonds of 1906-1936. These bonds are part of an authorized issue of $6,000,000, of which $3,002,500 are outstanding. The railways owned, or controled through ownership of stock, have a main line from Pottsville, Pa., to Mauch Chunk, with various lines diverging from Pottsville, in all, about 70 miles of track.

Hudson Companies.—Harvey Fisk & Sons, New York, are offering a limited amount of the authorized and outstanding $10,000,000 6 per cent. secured convertible notes, due 1911, of the Hudson Companies at 101¼, yielding about 5½ per cent. The notes are secured by the deposit of Hudson & Manhattan first mortgage 4½ per cent. bonds, due 1957, at the rate of $1,500 bonds for each $1,000 notes outstanding. The notes are convertible at par at maturity or any prior redemption date into Hudson & Manhattan bonds at 85. The Hudson Companies, originally the construction company for the Hudson river tunnels, is now the holding

company for the Hudson & Manhattan, which operates the Hudson river tunnels.

INTERBOROUGH RAPID TRANSIT (NEW YORK).—J. P. Morgan & Co., New York, and Lee, Higginson & Co., Boston, have bought and resold $10,000,000 45-year 5 per cent. series A bonds of 1907-1952. The offering price to the public was 103¼. Of the total authorized issue of $55,000,000, there are outstanding, including the present issue, $11,590,000; and pledged as security for 6 per cent. notes, $28,108,800, leaving $15,301,200 to be issued for additional properties.

KANSAS CITY SOUTHERN.—Sutro Brothers & Co. and Procter & Borden, both of New York, are offering the unsold portion of $1,500,000 refunding and improvement mortgage 5 per cent. bonds of July 1, 1909-1950, at a price to yield 4.90 per cent. This is part of the $10,000,000 bonds sold a short time ago by the company.

MISSOURI PACIFIC.—The *Commercial and Financial Chronicle* says that the plan which has been under consideration for several months for making a new bond issue for an amount sufficiently large to provide for present needs and future requirements during a long term of years, has, it is understood, been practically completed and aside from some formalities awaits the approval of the board of directors at a meeting which will be held probably early in August. Kuhn, Loeb & Co., New York, have agreed to handle the bonds, it is said.

PENNSYLVANIA.—Edward B. Smith & Co., New York, have prepared an interesting pamphlet on the probable effect of the opening of the New York terminal of the Pennsylvania on the value of the company's stock. In the circular it is figured that during the last ten years the company has paid $178 into the property for every $100 capital stock or bonds issued or assumed.

PENINSULAR RAILWAY.—This company has been incorporated with a capital stock of $12,000,000 to consolidate the following electric railways of the Southern Pacific, which subscribed for new stock to the amounts named: Peninsular Railroad, $500,000 stock; San Jose & Los Gatos Interurban, $200,000, and the Santa Clara Interurban, $500,000. A press despatch says:

"The consolidated company will comprise all the present and contemplated railway systems on the San Francisco peninsula from that city to San Jose and vicinity, including those in intermediate towns. It comprehends lines making complete electric connection from this city to the metropolis, through the grounds of the Stanford University, the Mayfield Los Gatos short-cut steam road, soon to be electrified; a line from San Mateo to Alum Rock park, a distance of 40 miles, running via Redwood, Menlo Park, Palo Alto, Mayfield, Mountain View, Sunnyvale, Santa Clara and San Jose.

"The total estimated length of the lines under the control of the Peninsular Railway Co. is 222.20 miles. The directors are named as J. T. Burke, Paul Shoup, C. B. Seger, P. F. Dunne and F. E. Chapin."

ROSCOE, SNYDER & PACIFIC.—See Atchison, Topeka & Santa Fe.

ST. LOUIS & SAN FRANCISCO.—The $6,125,000 extended five-year 4½ per cent. notes, maturing December 1, 1909, have been called for payment on August 6. On the payment of these notes the general lien 5 per cent. bonds will become a first mortgage also on the line of the St. Louis, San Francisco & New Orleans, running from Hope, Ark., to Ardmore, Okla., 232 miles. This will make the bonds on August 6 a first lien on 897 miles of road, subject only to $489,000 outstanding bonds, for the redemption of which general lien bonds are reserved. (May 14, p. 1052. See also an article in regard to this company in General News, current issue.)

SOUTHERN PACIFIC.—See Peninsular Railway.

WABASH.—The United States Circuit Court of Appeals has confirmed the judgment of the Supreme Court of Ohio in holding that the claim of about $900,000, being the principal and interest on $150,000 equipment bonds of 1862, of the Toledo & Wabash, is valid. There were $600,000 of these bonds issued, but the holders of other bonds did not bring suit in time to make their claim legal.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Houston Belt & Terminal has ordered 3 switching locomotives from the Baldwin Locomotive Works.

The Chicago, Rock Island & Pacific has ordered fifteen consolidation locomotives from the Baldwin Locomotive Works.

The Little River R. R. Co., Townsend, Tenn., has ordered one Mallet compound locomotive from the Baldwin Locomotive Works.

The Chicago & North Western has ordered 40 consolidation, 25 Pacific and 15 switching locomotives from the American Locomotive Co.

The St. Louis & San Francisco has ordered 15 consolidation locomotives from the Baldwin Locomotive Works, delivery to commence September 1.

General Dimensions.

Weight on drivers	181,750 lbs.
Weight, total	201,500 lbs.
Cylinders	22 in. x 30 in.
Diameter of drivers	57 in.
Boiler, type	Straight top
" working steam pressure	200 lbs.
Heating surface, tubes	2,922 sq. ft.
" " firebox	178 "
" " total	3,100 "
Grate area	51 "
Tubes, number	386
" outside diameter	2 in.
" length	14 ft. 6½ in.
Water capacity	7,500 gal.
Coal capacity	12 tons.

CAR BUILDING.

The Colorado & Southern is in the market for four passenger coaches.

The Chicago Railways expect to buy about 80 garbage dump cars, both motor and trailer.

The Alabama Great Southern has ordered 10 passenger coaches from the Pullman Company.

The Panama Railroad is asking bids until July 26 for 6 passenger coaches. (Circular P-232.)

The Chesapeake & Ohio has ordered 1,000 all-steel hopper cars from the American Car & Foundry Co.

The Odessa & Keystone, Odessa, Fla., will soon be in the market for several coaches and also a combination passenger car.

The Chicago & North Western has ordered 1,000 box, 500 gondola and 500 ore cars from the American Car & Foundry Co.

The Detroit United Railway has issued specifications for 50 thirty-foot, double-truck, pay-as-you-enter cars, and 5 interurban express cars.

The Great Northern, reported in the *Railroad Age Gazette* of July 2 as being in the market for 1,000 box cars, has ordered 1,000 forty-ton box cars from Haskell & Barker.

The Ft. Wayne & Wabash Valley Traction, Ft. Wayne, Ind., is reported in the market for 4 interurban passenger, 2 motor freight, 4 freight trailer and 10 gondola cars. This item is not confirmed.

The Northern Pacific, reported in the *Railroad Age Gazette* of June 11 as being in the market for from 1,000 to 2,000 box cars, has ordered 1,000 forty-ton box cars from the Pullman Company.

The Buffalo, Rochester & Pittsburgh, reported in the *Railroad Age Gazette* of July 2 as asking prices on gondola or hopper cars, is in the market for 1,000 forty-ton box cars and 1,000 fifty-ton steel hopper cars. The box cars will be 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The bodies will be of wood and the underframes of steel. The hopper cars will be 30 ft. long and 9 ft. 5½ in. wide, inside measurements; 31 ft. 6 in. long over striking plates, 10 ft.

wide and 10 ft. high, over all. The following special equipment will be common to all cars:

Bolsters, body	Steel plate
Bolsters, truck	Cast steel
Brakes	Westinghouse
Brake-beams	Buffalo
Brake-shoes	Steel back.
Couplers	Climax, 5-in. x 7-in.
Dust guards	Wood
Journal boxes	Symington
Side bearings	Plain
Springs	Railway-Steel Spring Co.
Trucks	Archbar

The following equipment refers to the box cars only:

Axles	Open-hearth steel, 5-in. x 9-in.
Brasses	M. C. B., 5-in. x 9-in.
Doors	No. 3 security
Door fastenings	National Malleable Castings Co.
Roofs	Chicago Improved Winslow
Wheels	Cast iron, 650 lbs.

The following equipment refers to the hopper cars only:

Axles	Open-hearth steel; 5½-in. x 10-in.
Brasses	M. C. B., 5½-in. x 10.
Wheels	Cast iron, 700 lbs.

The Interborough Rapid Transit Co., New York, reported in the *Railroad Age Gazette* of June 11 as having ordered 100 elevated cars from the Barney & Smith Car Co., Wason Manufacturing Co., St. Louis Car Co. and Jewett Car Co., has also ordered 240 subway cars, as follows: American Car & Foundry Co., 110; Standard Steel Car Co., 40; Pressed Steel Car Co., 100. The elevated train cars will weigh 56,000 lbs. and will be 38 ft. 8 in. long, 7 ft. 9⅜ in. wide and 8 ft. 10¼ in. high, inside measurements; 47 ft. ½ in. long and 8 ft. 9¼ in. wide, over all. Bodies will be of wood, with steel posts and underframes of wood. The following special equipment is common to all cars:

Axles	Oil-tempered steel
Brakes	Westinghouse
Brake-shoes	National Brake-Shoe Co.
Couplers	Van Dorn
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Heating system	Electric
Journal boxes	Symington
Lighting system	Incandescent lamps

The elevated train cars will have multiple unit control, 10 of the equipments being furnished by the Westinghouse Electric & Manufacturing Co. and 90 equipments by the General Electric Co. The following special equipment will be used on these cars only:

Motors	Westinghouse electric, 125 h. p.
Seats	Spring, cushion
Seat covering	Rattan
Trucks	St. Louis Car Co., Standard Motor Truck Co. and Wason Manufacturing Co.
Wheels	Steel-tired.

The subway cars will weigh about 69,000 lbs. and will be 38 ft. 7⅞ in. long, 8 ft. ¼ in. wide and 7 ft. 11¾ in. high, inside measurements; 51 ft. ½ in. long, 8 ft. 10 in. wide and 12 ft. high, over all. The bodies and underframes will be of steel. The special equipment will include:

Bolsters, body	Built up
" motor truck	Cast steel
" trailer truck	Built up
Control equipment	General Electric Co.; type M
Doors	Steel
Doors operating devices	Manual and pneumatic
Motors	General Electric Co., 200 h. p.
Seats	Steel frame, spring cushion
Seat covering	Rattan, "Quiride"
Trucks	Motor, cast-steel side frame; Am. Loco. Co.
Trucks	Trailer, American Locomotive Co. and Standard Motor Truck Co.
Vestibules	Steel
Wheels	Solid steel

The Harriman Lines have ordered 21 dining cars, 9 observation, 9 combination, 15 chair, 60 coaches, 50 baggage, 14 sixty-ft. postals and 6 forty-ft. postals, from the Pullman Co., as noted in the *Railroad Age Gazette* of July 2. The first three lots are to be delivered between October and December and deliveries of the rest are to begin in November. The diners will be 72 ft. 6 in. long, 10 ft. ⅜ in. wide, 15 ft. $1\frac{9}{16}$ in. high, bodies of wood, underframes of steel, weight 125,000 lbs., and to have a capacity of 30 passengers. The observation cars have the same dimensions except as to height, which will be 14 ft. 11½ in. Their weight will be 120,000 lbs. and the capacity 40. The combination cars will be 69 ft. long, 10 ft. ⅜ in. wide and 14 ft. $1\frac{5}{8}$ in. high. The chair cars will be 59 ft. 10 in. long, 9 ft. 9⅝ in. wide and 14 ft. high; weight, 94,000 lbs., and capacity, 60. The coaches will have the same dimensions and weight, but the seating capacity is 72. The baggage cars will be 60 ft. 1½ in. long, 9 ft. 9⅝ in. wide and 14 ft. high; will be all-steel, and weigh 90,000 lbs. The 60-ft. postal cars have the same dimensions as the baggage and will weigh 108,000 lbs. The 40-ft. postals will be 40 ft. 1 in. long, with the same width and height as the other postals. Their weight will be 77,000 lbs. The special equipment is the same for all.

Axles	M. C. B.
Bolsters, body and truck	Commonwealth
Brake-beams	Chicago Railway Equipment Co.
Brake-shoes	American Brake Shoe & Foundry Co.
Brasses	Hewitt
Couplers	Janney
Draft gear	Session's Friction
Heating system—vapor	Chicago Car Heating Co.
Journal boxes	National Malleable Castings Co.
Lighting system	Pintsch gas
Platforms	Standard Coupler Co.
Seats	S. Karpen & Bros.
Side bearings	W. H. Miner Co.
Springs	Railway Steel Spring Co.
Trucks	Double Body Bolster Co.
Ventilators	Globe
Vestibules	Pullman
Vestibule diaphragms	Acme
Vestibule trap doors	O. M. Edwards Co.
Wheels	Rolled steel

Of the combination cars eight have baggage and mail apartments, 30 ft. being in the mail apartment. The other one has 15 ft. for mail, 20 ft. for baggage and 34 ft. for passengers. The chair cars and coaches have General Railway Supply Co. vestibule trap doors instead of those listed above. The baggage and postal cars have Forsyth platforms.

The Harriman Lines, as reported in the *Railroad Age Gazette* of July 9, have ordered 3,325 box, 500 flat, 224 flat car bodies, 100 hopper bottom coal cars, 400 gondola, 250 furniture, 110 single deck stock and 59 cabooses, from the American Car & Foundry Co., the Pressed Steel Car Co., and the Standard Steel Car Co. The box cars will have a capacity of 50 tons and will be 40 ft. ⅛ in. long, 9 ft. 2 in. wide, 9 ft. 2¼ in. high, inside measurements; 41 ft. 10 in. long, 10 ft. wide and 14 ft. $1\frac{15}{16}$ in. high, over all. These cars will weigh 40,617 lbs., the bodies will be of wood and the underframes of steel. The flat cars will weigh 33,650 lbs., will have a capacity of 50 tons, and will be 40 ft. 10 in. long, 9 ft. 4½ in. wide, and 3 ft. $9\frac{11}{16}$ in. high. The flat car bodies will have the same dimensions as the flat cars, 212 of them being of 50-ton capacity and 12 of 40-ton capacity. The steel hopper bottom coal cars will weigh 39,600 lbs., will have a capacity of 50 tons and will be 30 ft. ¼ in. long, 9 ft. 6 in. wide, and 5 ft. 9¼ in. high. The steel gondola cars will weigh 40,270 lbs., will have a capacity of 50 tons and will be 40 ft. 4 in. long, 9 ft. 4⅞ in. wide and 4 ft. 6 in. high. The furniture cars will weigh 39,281 lbs., will have a capacity of 30 tons and will be 40 ft. ⅛ in. long, 9 ft. ⅝ in. wide, 10 ft. ¼ in. high. Bodies will be of wood and the underframes of steel. The single deck stock cars will weigh 35,291 lbs. and have a capacity of 40 tons and will be 36 ft. 6⅛ in. long, 8 ft. 5⅜ in. wide, and 8 ft. ¼ in. high. Bodies will be of wood and the underframes of steel. The all-wood caboose cars will weigh 32,500 lbs. and will be 30 ft. long, 9 ft. 10¼ in. wide and 14 ft. 4¼ in. high.

Bolsters, body	Commonwealth
" trucks	Simplex
Brake-beams	Damascus
Brake-shoes	American Brake Shoe & Foundry Co.
Brasses	Hewitt
Couplers	Climax, National Malleable Castings Co.
Door fasteners	National Safety
Door fixtures	Security
Draft gear	Miner
Journal boxes	National Malleable Castings Co.
Roofs	Standard Railway Equipment Co.
Springs	Railway Steel-Spring Co.
Truck frames	Andrews

Six hundred and twenty-five of the box cars will be equipped with the Bettendorf underframes and Bettendorf truck side frames. The furniture and stock cars will have National hollow brake beams instead of those listed above. The flats, coal cars and gondolas are to be delivered beginning Sept. 1, and the others beginning Oct. 1.

IRON AND STEEL.

The Baltimore & Ohio is said to be in the market for 1,800 tons of bridge steel.

The Pere Marquette has ordered 1,500 tons of rails from the Carnegie Steel Co.

The Odessa & Keystone, Odessa, Fla., will soon be in the market for 40-lb. rails.

The St. Louis Southwestern is said to be in the market for 2,000 tons of bridge steel.

The Southern Pacific has ordered 20,000 tons of 90-lb. rails for its lines in Louisiana and Texas.

The Texas Central has ordered 2,000 tons of 80-lb., open hearth rails from the Colorado Fuel & Iron Co.

The Tennessee Coal & Iron Co. is said to have received an order for 50,000 tons of rails for shipment to Buenos Ayres, South America.

The Chilian State Railways, Direccion-General de Obras Publicas, Santiago, is asking bids up to September 1 on rails and accessories.

General Conditions in Steel.—Authoritative reports from steel circles are that certain plants have been compelled to refuse orders which call for delivery during the next two months. There has been a brisk movement in rail orders lately and the railways have certainly been supporting the mills through orders for both locomotives and cars. Chairman E. H. Gary, of the United States Steel Corporation, is quoted as having said that while the sale of steel has not reached the high-water mark of years past, it is better now than it was several months before the financial depression.

RAILROAD STRUCTURES.

BALLINGER, TEX.—The Gulf, Colorado & Santa Fe will build a modern stone passenger depot to cost about $25,000.

BLOOMINGTON, IND.—The Chicago, Indianapolis & Louisville has let a contract to W. F. Stillwell, Lafayette, Ind., for the construction of a 17-stall engine house with concrete foundation, brick walls and timber roof, and the turntable foundation and cinder and coal pit in connection with the same. The contract is for $43,000 and improvements in the yard will increase the total cost to about $100,000.

BONHAM, TEX.—An officer of the Texas & Pacific writes that instead of building a new roundhouse, as stated in the *Railroad Age Gazette* of July 2, the company will increase the capacity of the one now in use to 10 stalls and put in a new concrete foundation.

COVINGTON, KY.—According to press reports, the Chesapeake & Ohio will put up a new station in Covington, near Madison avenue and Seventeenth street.

DENISON, TEX.—The last pier of the new steel bridge for the Missouri, Kansas & Texas is being placed. The bridge will be over 1,000 ft. long, will be of five spans and will cost about $100,000.

Work, it is said, is to be started at once on a new station at Denison.

DULUTH, MINN.—The Minneapolis, St. Paul & Sault Ste. Marie has had architects prepare plans for a new fireproof passenger station to cost $100,000.

EDMONTON, ALB.—Arrangements are said to have been made by the Canadian Northern and the Grand Trunk Pacific to put up a union station and to use the same entrance into the city.

KANSAS CITY, MO.—The lower house of the city council on July 7 passed an ordinance to authorize the construction of the proposed new union passenger station and terminals. The ordinance has yet to be formally accepted by the board of directors of the Kansas City Terminal Railway Co. The ordinance has been pending for seven years. (Oct. 23, 1908, p. 1180; May 21, 1909, p. 1102; May 28, p. 1135.)

The Kansas City Southern is building a reinforced concrete freight house to cost about $40,000.

MEMPHIS, TENN.—According to press reports, the building of a union station in Memphis has been definitely postponed through the failure of the various roads entering that place to reach an agreement.

MIDDLETOWN, OHIO.—An official of the Cleveland, Cincinnati, Chicago & St. Louis writes that a $20,000 station is being built. It is to be 25 ft. x 105 ft., of light colored brick with terra-cotta tile roof, modern throughout. Work is being pushed as rapidly as possible and will probably be completed by early fall.

MILWAUKEE, WIS.—Contract is said to be let to Hase & Weiher, at about $30,000, for constructing concrete subways under the Chicago & North Western tracks at Lincoln, Kinnickinnic and Chicago avenues and Becher street, in Milwaukee.

NEENAH, WIS.—Contract is said to be let to the O'Keefe & Orbison Construction Co., of Appleton, Wis., for putting up three concrete and steel bridges, to have a combined length of 2,700 ft., for the Chicago & North Western, in Neenah and in Menasha. It is expected to have the work finished this year.

NORFOLK, VA.—The Virginian Railway, it is said, will build a union depot and office building, which will be used jointly by the Virginian, the Norfolk & Western, the Norfolk & Southern, and perhaps by other roads. Work will be commenced as soon as the city council grants a permit.

PHILADELPHIA, PA.—According to press reports, bids are wanted July 21 by the Bureau of Surveys, Philadelphia, for five bridges to be built over the railway crossings in the 38th, 40th and 42d wards. The cost of the work is to be divided between the railway and the city.

PITTSBURGH, PA.—Contracts are said to be let for putting up a steel bridge over the Ohio river at a cost of about $500,000, to connect Sewickley and Moon township. Contract for masonry let to Adam Laidlaw & Co., for $98,907. Other bids for masonry were: Dravo Construction Co., $137,843; Drake-Stratton Co., $142,785; Morris Brothers Co., $145,984; J. L. Poli & Co., $148,001; Pneumatic Caisson Co., $151,483. Contract for the steel superstructure let to the Fort Pitt Bridge Co. at $372,400. Other bids were: Penn Bridge Co., $381,180; American Bridge Co., $385,000; McClintic-Marshall Construction Co., $397,900; King Bridge Co., $408,000; Pennsylvania Steel Co., $444,000. The steel superstructure is to be 1,350 ft. long, including a channel span of 750 ft., to be 90 ft. above low water mark. The other two spans are each to be 300 ft. long. The bridge roadway is to be 28 ft. wide, with 7-ft. sidewalks. All work is to be finished by November, 1910.

PRINCE RUPERT, B. C.—Contract is said to have been let to the Canadian Bridge Co., of Walkerville, Ont., at $400,000. for putting up six steel bridges on the first section of the Grand Trunk Pacific east from Prince Rupert, B. C.

SCRANTON, PA.—The Delaware, Lackawanna & Western is said to have plans ready for putting up a freight house at Scranton.

TAYLOR, TEX.—Plans are made and bids will soon be asked for the construction of a machine shop and roundhouse for the International & Great Northern.

TONOPAH, NEV.—The repair shops and a roundhouse of the Tonopah & Goldfield, at Tonopah, were destroyed by fire June 29. The loss is estimated at $100,000.

TOPEKA, KAN.—The Topeka Railway Company is planning to build an addition to its car shops.

WILMINGTON, DEL.—Regarding the newspaper reports that a four-track bridge is to be built over the Brandywine creek at Wilmington, an officer of the Baltimore & Ohio writes that such work is under consideration, but the plans are not yet completed and bids have not yet been asked. It is probable that this will be done at an early date.

SIGNALING.

The Northern Pacific has let to the Hall Signal Company a contract for automatic block signals to equip the line between Tacoma, Wash., and Seattle, 41 miles, double track. There will be 51 signals, which will be of the three-position upper quadrant type, with the Hall new style "H" top post mechanism. The B. & O. type of sheet steel spectacle will be used in this installation. Switch indicators will be provided at switches. The signals will be "normal clear" with auxiliary wire circuit.

Supply Trade News.

Henry Clay Lowe, president of the Lowe Brothers Co., Dayton, Ohio, died on July 4th at Dayton. Mr. Lowe was 61 years old and had been associated with his brother, Houston Lowe, in this business since 1872.

The Abell Equipment Manufacturing Co., Chicago Heights, Ill., has been incorporated with $35,000 capital stock to build cars and do a general manufacturing business. The incorporators are Oliver J. Abell, Elijah M. Sweet, and Frank M. Sweet.

The new Central of New Jersey cars, the order for which was noted in the *Railroad Age Gazette* of July 2, will have Andrews side frames, cast-steel truck bolsters and Simplex couplers and springs, made by the American Steel Foundries Co., Chicago.

The general offices of the Ralston Steel Car Co., Columbus, Ohio, have been moved from the new First National Bank building to the new office building at the shops in East Columbus. A downtown office will be maintained in the Bank building as a sales agency.

George L. McCabe, who, for the past ten years, has been in the railway and mining sales departments of the Garlock Packing Co., Palmyra, N. Y., and of the Anchor Packing Co., Philadelphia, Pa., has assumed similar duties with the New York Belting & Packing Co., Ltd., New York.

The contract for the addition to the plant of the Davenport Locomotive Works, Davenport, Iowa, which was mentioned in the *Railroad Age Gazette* of February 19, 1909, has been let to the McClintic-Marshall Construction Co., Pittsburgh, Pa. About 500 tons of structural steel will be required.

The Railroad Automatic Track Inspector Co., Tacoma, Wash., has just shipped four automatic track inspectors to China and expects to fill immediately an order for two machines for railways in the United States. Important improvements have been made in the machine recently, although those now in use have proved satisfactory.

H. B. Marshall, who for many years has been connected with the Chicago sales office of the Electric Storage Battery Co., Philadelphia, Pa., has been appointed contract agent, in charge of the company's office in the Wainwright building, St. Louis, Mo. Taliaferro Milton, formerly contract agent at the St. Louis office, has been appointed engineer of the Chicago sales office of the company.

The National Railway Devices Co., Chicago, reports much interest on the part of railways in the Schroyer uncoupling apparatus, which is already a standard on one of the large western trunk lines and is being applied largely by other roads. To show its confidence in the efficiency of this device, the company will furnish the use of one gratis to any railway officer who desires to test it in service.

John Herbert Evans, who at the time of his death, July 2, was railway sales agent for the Sherwin-Williams Co., Cleveland, Ohio, was born in Aylesbury, Buckinghamshire, England, in 1857. He came to America in 1883, settled in Kansas and was employed in the storekeeper's office of the Santa Fe. After serving on two other roads he left railway work, and since 1888 had been sales agent with the Union Steel Co., the Griffin Wheel Co., Chicago, and the Sherwin-Williams Co.

Daniel E. Manson has resigned as manager of the Boston office of the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., to engage in engineering work with a corporation of which he will be vice-president and manager. Mr. Manson had been with the Westinghouse company for 12 years, for several of which he was at the head of the Boston office. George E. Bates, of the Boston office, succeeds Mr. Manson as head of the Westinghouse sales force for the New England district.

The Ralston Car Works, Ralston, Neb., the incorporation of which was reported in the *Railroad Age Gazette* of February 26, has elected the following officers and board of directors: President and general manager, C. A. Ralston; vice-president, M. S. Dean; secretary, Howard Baldrige; treasurer, L. Howard; directors, Howard Baldrige, M. S. Dean, Wm. Hassman, L. Howard, G. T. Ross, J. E. Simons and C. A. Ralston. About $80,000 is to be spent on a plant at Ralston, which will be equipped to do general car repairing.

The Forsyth Steel Tie Co., Pittsburgh, Pa., has bought from the Pittsburgh Pole & Forge Co., Pittsburgh, its entire business, including the works at Verona, Pa. The new owners will make, on a larger scale, the same line of forgings and railway specialties heretofore made by the old company, and will also make the Forsyth steel cross tie, brake-shoe key, tie plate, follower plate, brake lever and other devices for which it owns patents. B. D. Foster, Parker Biggert and T. D. Dallmeyer, heretofore with the Pittsburgh Pole & Forge Co., will be with the new company.

The Isthmian Canal Commission asks bids up to July 26 on two locomotive coaling cranes and one 75-h. p. motor car. (Circular No. 521.) Bids are asked up to July 23 on anti-corrosive and anti-fouling compositions, paint and ties. (Circular No. 522). Bids are asked up to August 2 on cast-iron car wheels, axles, rivets, bolts, steel cable, pipe, valves, and other fittings, tool grinders, carborundum wheels, drills and creosoted and uncreosoted piles. (Circular No. 523.) Bids are asked up to July 19 on boiler compounds and collapsible steel forms for culverts. (Circular No. 523-A.)

Earl G. F. Smith has resigned as secretary of the Railway Supply Manufacturers' Association, effective August 1. The executive committee of the association has a number of applications for the position under consideration, but no decision has yet been reached. Communications on the subject of a successor to Mr. Smith may be addressed to any member of the committee in charge of selecting a new secretary, which committee consists of the following members of the executive committee: E. M. Grove (president), McConway & Torley Co., Pittsburgh, Pa.; L. R. Phillips (vice-president), National Tube Co., Chicago, and W. H. Miner, W. H. Miner Co., Chicago.

B. V. H. Johnson, who for the past two years has represented the Scullin-Gallagher Iron & Steel Co., St. Louis, Mo., at the home office, has resigned to accept a vice-presidency of the Commonwealth Steel Co., St. Louis, on August 1. Mr. Johnson is a graduate of the Manual Training School of St. Louis, and a native of that city. He was for several years with the Pullman Company and afterwards with the New York, New Haven & Hartford. In 1898 he became assistant to Clarence H. Howard, then secretary and western manager of the Safety Car Heating & Lighting Co., New York. He remained with this company until he went to the Scullin-Gallagher company. Clarence H. Howard, president of the Commonwealth Steel Company, George K. Hoblitzelle, vice-president and treasurer, Harry M. Pflager, also a vice-president, and Mr. Johnson were all schoolmates at the Manual Training School.

TRADE PUBLICATIONS.

Machinery for Handling Earth and Stone.—The Western Wheeled Scraper Co., Aurora, Ill., has issued a catalogue of 120 pages on the machinery made by the company. It is well illustrated, many of the machines being shown in actual use.

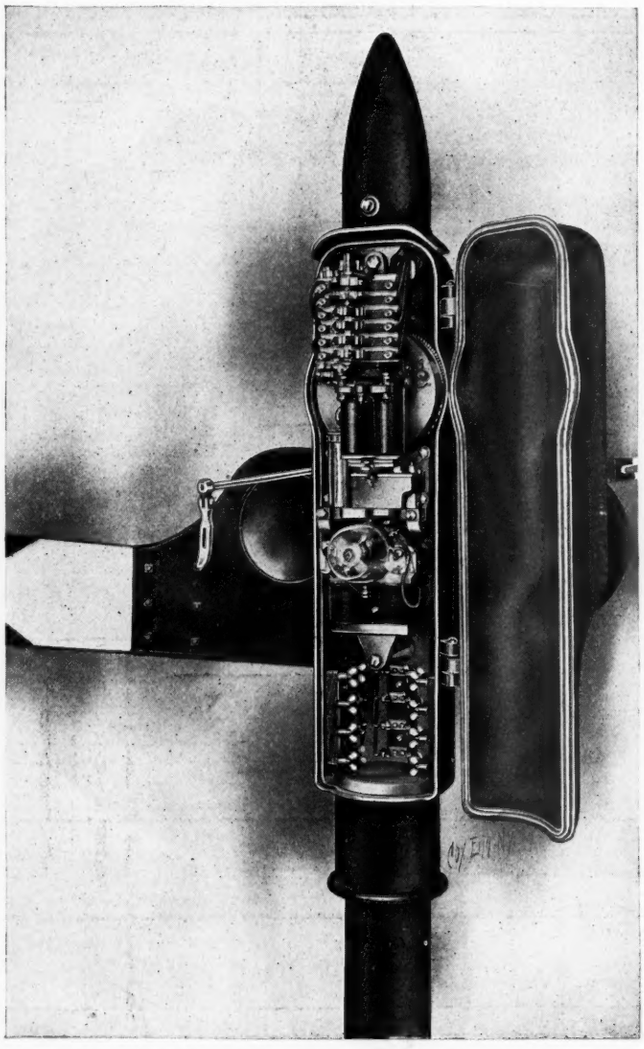
Ventilated and Heated Refrigerator Car.—A pamphlet issued by the Moore Patent Car Co., 334 Endicott building, St. Paul, Minn., gives the results of a series of trips made during the past year to demonstrate the merits of a patent ventilated refrigerator car which may be heated in cold weather. The car is Chicago, St. Paul, Minneapolis & Omaha vegetable car No. 8,530, and has been tested in long and short trips on several roads with different perishable cargoes.

United States Metallic Packing.

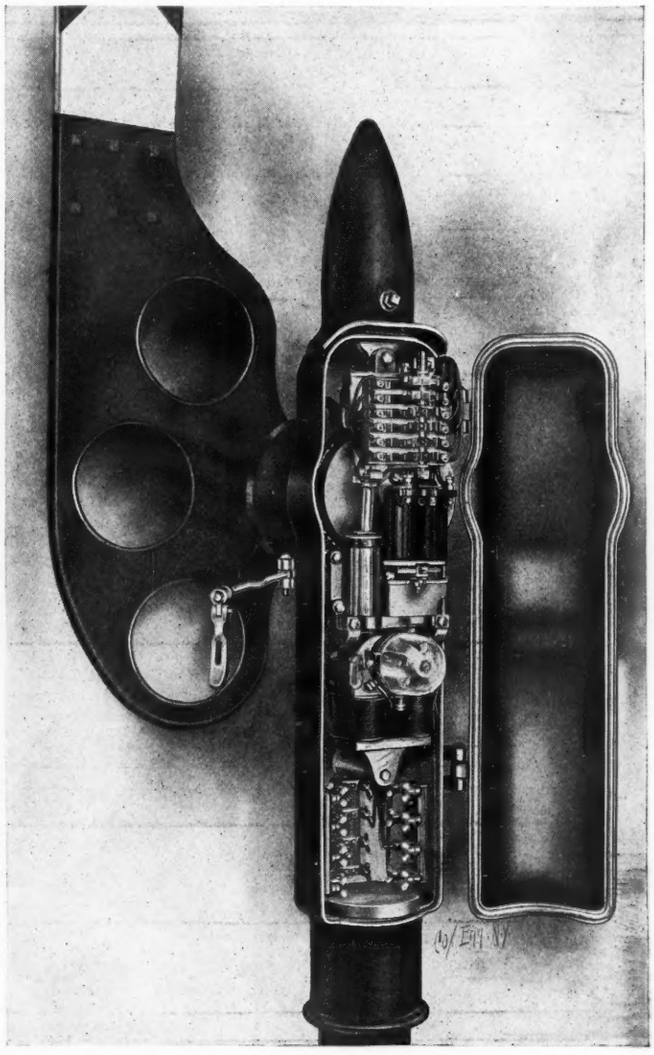
The improved metallic packing, made by the United States Metallic Packing Co., Philadelphia, Pa., for locomotive piston rods and valve stems using the King patent ring, was described in the *Railroad Age Gazette* of June 18, page 1362, and of July 9, page 70. The latter article was illustrated by a drawing in which the preventer was turned the wrong way. In this packing, the rings are so constructed that when they are placed on the rod the rings are interlocking. This feature is particularly important to roundhouse men, as it prevents the rings from falling off the rod and dropping down into the pit. The only parts requiring renewals are the babbitt metal rings and perhaps the brass half pieces let into the steel sliding plate, as shown in the illustration in the first article. There is only one ground joint to be kept in order, and since this is steel against a cast iron gland, the wear should be almost negligible.

The Hall Top Post Semaphore.

The Hall Signal Co., New York, has brought out an electric semaphore signal with the mechanism in the top of the post, and it is of such neat and compact design that one scarcely notices that the mechanism is there. The makers designate this new signal as style H, and its appearance is shown in the accompanying engravings. These engravings do not show the bracket for the lamp which is necessary in night signal, but the position of the lamp is sufficiently indicated by the position of the spectacles in the casting. The mechanism is readily adapted to any form of spectacle and to the movement of the arm in either the upper or the lower quadrant; but the signal here shown is three position, upper quadrant. The mechanism will start the arm upward from any intermediate position, and the apparatus employed for holding the arm in the caution or the clear position consists of a cylinder filled with oil. The makers have given us the following details regarding this semaphore equipment:



Arm in Stop Position.



Arm in Clear Position.

The weight of the entire mechanism is less than 100 lbs., and the weight of the mechanism without the motor is less than 70 lbs. The dimensions of the assembled mechanism are 25⅝ in. high, 8⅜ in. wide and 10¾ in. deep. The dimensions of the case for the mechanism are 35 in. high, 10⅛ in. wide, and 13 in. deep.

A 10-volt battery will move the blade and spectacle through an arc of 90 deg. in 8 seconds. A 6-volt battery will move it through the same arc in 12 seconds. As the signal picks up at any angle or position of the blade, a movement through a smaller arc is accomplished in proportionately less time.

Accessibility of parts is all that could be desired. The entire mechanism may be removed from the case by taking out two cap screws without disturbing the spectacle or blade, since the blade shaft is made in two parts interlocked, one supporting the blade and one fastened to the clutch magnet; without disturbing the mechanism in the case, the cylinder and oil reservoir may be removed by taking out two cap screws; and the circuit controller, the slot magnets and the motor may be removed with equal ease.

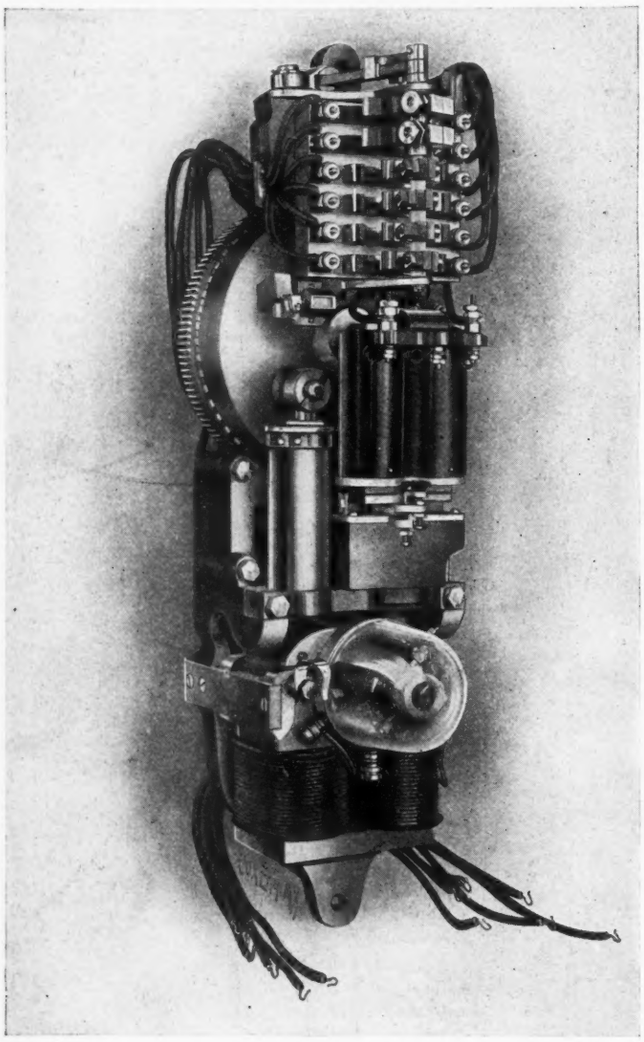
The operating mechanism is composed of the motor and its gears, a clutch magnet of the disk type with its armature, and the circuit controller.

The clutch magnet a is keyed to the semaphore shaft by key b and the armature c is held in position by pins d in the clutch magnet, so that the armature revolves with the magnet, but is free to move laterally. A Norway iron clutch ring e is fitted into large gear f and is placed between the clutch magnet and its armature. This clutch ring revolves with the gear independent of the clutch magnet and armature, and, like the clutch armature, is allowed a slight lateral motion. When the power is applied to the motor, the large gear f, which is connected to the motor pinion by a chain of gears, revolves and carries with it the clutch ring. The circuit through the clutch magnet is in multiple with the motor circuit, and is closed when the motor circuit is completed. Since the clutch ring is between the clutch magnet and its armature, it is clasped rigidly between them by the force of attraction, and the clutch magnet and semaphore shaft to which it is attached are forced to revolve with the clutch ring and large gear, thus clearing the signal. When the blade reaches the 45-deg. position, the circuit for the motor and clutch is opened through the circuit controller operated by the clutch magnet, and the blade is free to come to rest or return to the stop position. If the contact on the distant relay is closed, however, the circuit for the motor and clutch is again completed by a multiple circuit, and the blade is moved to the vertical or clear position, when this circuit is again opened by another contact on the circuit controller.

The blade is held in its position of rest by the holding mechanism in the following manner: The piston g connected to the clutch magnet by rod h moves in cylinder j. The cylinder is connected to the oil reservoir k by port l, this port being controlled by valves m and n. Valve m is connected to the armature of the holding magnets by stem r, and when these magnets are energized the valve m is closed. Valve n is automatic in action; with valve m closed, and with a weight on the piston tending to force the liquid from the cylinder to the reservoir, valve n is closed by the pressure of liquid

against it, and both passages from the cylinder to the reservoir are closed. When the piston is carried vertically by the movement of the clutch magnet, the liquid in the reservoir is drawn into the cylinder by suction through valve n. When the signal blade comes to rest in its position of "caution" or "clear," if the holding magnets are energized and valve m accordingly closed, the weight of the signal on the piston tends to force the oil back into the reservoir, but in doing so automatically closes valve n and the piston is held in its position of rest. A further movement of the piston repeats this operation. The signal is accordingly held clear by the oil in the cylinder.

When the holding magnet is de-energized by the opening of the circuit, valve m is opened, and the opening of this valve provides a free passage for the oil from the cylinder to the reservoir. The size of the opening of valve m is adjusted so that the return flow of oil is regulated in such a manner as to permit the blade to return to its



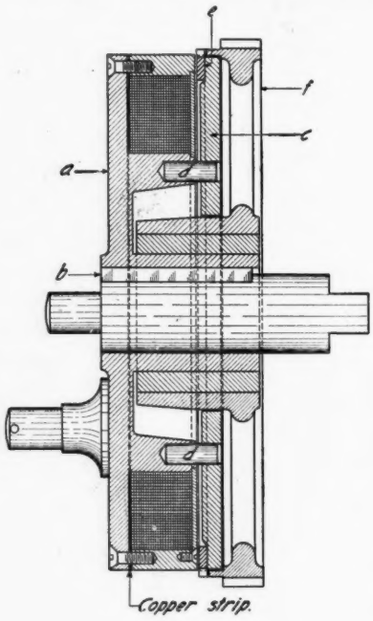
Mechanism Complete.

normal position with sufficient retardation to prevent jarring the mechanism. The movement is made at constant speed, which may be regulated within limits, but it is impossible to completely close the valve with these adjustments either by intent or accident.

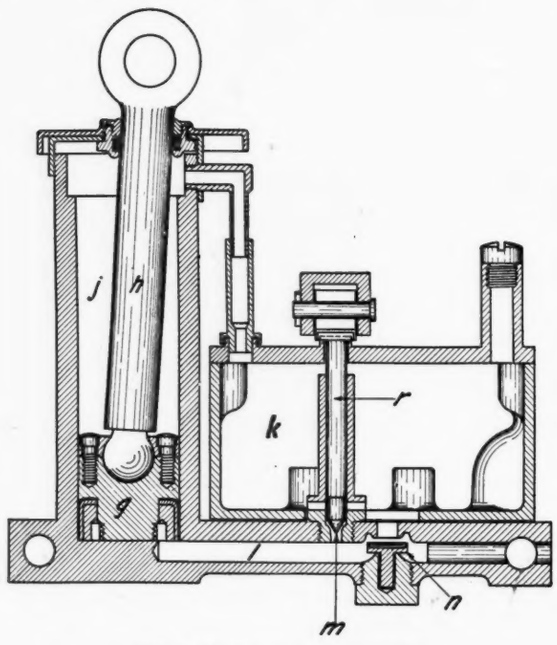
Every possible precaution has been taken to guard against improper indications. Although it was considered highly improbable that residual magnetism in the clutch magnet could hold the signal clear with the circuit open, for the reason that practically the entire effective weight of the spectacle and blade tends to release the magnet, yet in addition to special care in annealing and testing the iron used for the magnet and armature, the additional precaution is taken of breaking the magnetic circuit in the clutch by the insertion of non-magnetic material as shown in one of the drawings.

No brake is provided on the motor as none is required, and the brushes are made of solid aluminum instead of copper leaf, which not only allows the motor to run backward without injury to the brushes, but provides a brush proved by test to be more enduring and less liable to cut the commutator than the brushes ordinarily used on signal motors. The composition parts, usually made of brass or bronze, are made of the best obtainable non-magnetic metal, that is tougher and stronger than the best grades of bronze, possesses the ingredients of a good bearing metal, and is about one-third the weight of brass or bronze. The armature and clutch magnet are ground and polished; all the roller bearings are hardened and ground, and all parts made interchangeable.

This signal is perfectly adapted to use with pole changing devices in the controlling circuits. The signal picks up at any angle, hence no slow releasing magnets are necessary, since the signal will start to clear as soon as the circuit which was broken by the operation of the pole changer is again completed. When, by the operation of the pole changer, the holding magnet opens for a fraction of a second,



Clutch.



Oil Cylinder and Reservoir.

the signal will drop only during the time the armature is away from the cores, and as the motor circuit controller will close in this position of the blade, the signal will immediately again assume the clear position. This action of the signal is so rapid as to be hardly discernible from an approaching train.

The oil cylinder being a new design exhaustive tests were made of it. An oil piston has many advantages over an air dash pot. The fear of the oil congealing in very cold latitudes is groundless when the proper oil is used. The oil used with this signal withstands a temperature of 40 deg. below zero without becoming viscous. As the oil in the cylinder and reservoir is non-volatile and cannot escape, there is every reason to expect that the one supply of oil will last for a long period of time without renewal. But the reservoir may be readily refilled without interference with the operation of the signal.